Series 1959, No. 17 Issued October, 1962

SOIL SURVEY

Washington County Maryland

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
MARYLAND AGRICULTURAL EXPERIMENT STATION

HOW TO USE THE SOIL SURVEY REPORT

THIS SOIL SURVEY of Washington County will help farmers in planning the kind of management that will protect their soils and provide good yields; it will assist engineers in selecting sites for roads, buildings, ponds, drainage and irrigation installations, and other structures; it will assist those interested in establishing or improving woodland; and it will add to our fund of knowledge about soils.

In making this survey, soil scientists examined the soils and noted features that would affect the suitability of the soils for farming, woodland management, engineering, residential developments, and other uses. The scientists plotted the boundaries of the different soils on aerial photographs. Then cartographers prepared from the photographs the detailed soil maps that are at the back of this report. Fields, woods, roads, and other landmarks can be seen on the maps.

Locating the soils

On the soil map, the boundaries of each soil are outlined and each kind of soil is identified by a symbol. Use the index to map sheets to find out which sheet of the soil map shows the area you wish to study. The map legend tells which soil each symbol stands for. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map. Suppose, for example, an area located on the map has the symbol WbB2. The legend shows that this symbol identifies Waynesboro gravelly loam, 0 to 8 percent slopes, moderately eroded. This soil and all others mapped in the county are described in the section "Description of the Soils."

Finding information

Different parts of the report will be of special interest to different groups of readers.

Farmers and those who work with farmers can get information about the soils from the section "Description of the Soils," and suggestions for agricultural management from the section "Capability Groups of Soils." From the section "Estimated Yields," they can find what yields can be expected from each kind of soil under a specified level of management. Those interested in woodland management will find suggestions in the section "Use of Soils for Woodland."

Engineers can refer to the subsection "Engineering Uses of Soils" in which are summarized characteristics that affect the suitability of the soils for highways, sewage disposal systems, and other engineering purposes.

County and community planners will find this report helpful in selecting sites for industrial and residential developments and sites to be reserved for public recreation. So far as practical, areas not well suited to agriculture should be selected for these purposes. Information in the following subsections will be useful: "Capability Groups of Soils"; "Use of Soils for Woodland"; "Engineering Uses of Soils"; and "Use of the Soil Survey in Community Planning."

Persons interested in science will find in the section "Formation and Classification of Soils" information about the parent material of the soils and the processes that transformed them into soils. They will also find a discussion of the classification of the soils of the county into great soil groups.

Terms that are likely to be unfamiliar to some readers are defined in the Glossary. The "Guide to Mapping Units," which is at the end of the report with the soil maps, shows the reader where in the report to find information about each particular soil.

★ ★ ★ ★

This soil survey was made as a part of the technical assistance furnished by the Soil Conservation Service to the Washington County Soil Conservation District. The soils in the county were mapped during the period 1940 to 1959, and fieldwork for the survey was reviewed and revised in 1959. Unless otherwise indicated, all statements in the report refer to conditions at the time fieldwork was in progress.

U.S. GOVERNMENT PRINTING OFFICE: 1962

For sale by the Superintendent of Documents, U.S. Government Printing Office Washington 25, D.C.

Contents

Series 1959, No. 17

Issued October 1962

SOIL SURVEY OF WASHINGTON COUNTY, MARYLAND

SURVEY BY BOYD D. GILBERT, MERL F. HERSHBERGER, R. S. LONG, EARLE D. MATTHEWS, RALPH E. RUBLE, AND GLENN V. WILSON, SOIL SCIENTISTS, SOIL CONSERVATION SERVICE

REPORT BY EARLE D. MATTHEWS

UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH MARYLAND AGRICULTURAL EXPERIMENT STATION

General Nature of the Area

Washington leads the counties of Maryland in fruit production. It ranks fifth in the State in dairying and sixth in livestock other than dairying. In 1954, Washington County ranked fourth in the State in value of all farm products sold (*6*).[1] It has a well-balanced and prosperous agricultural economy. There may be many reasons for this, but one of the most important is the large proportion of highly productive and well-managed soils.

The county is well suited to intensive agriculture. More than 60 percent of the acreage—about 178,000 acres—is suitable for regular cultivation. About 15 percent—45,000 acres—is more limited but is suitable for some cultivation. About 12 percent—35,000 acres—is not well suited to crops but is good for pasture. The remaining 13 percent of the county is mostly rough, very rocky or stony, and in some places severely eroded. Much of it is mountainous and is suitable for no more intensive use than forestry. About 1 percent of the county is so steep and stony that even forest management would be uneconomical and impractical.

Washington County is in the west-central part of Maryland. Its climate is favorable for general farming, livestock and dairy farming, and fruit production. Its broad limestone valley is one of the best agricultural areas in the East. However, there has been some trend toward suburban development, particularly around Hagerstown, the county seat and largest city, where considerable industrialization has occurred.

Location and Extent

Washington County (fig. 1) is in the narrowest part of the western arm of the State, where it is only a very few miles across Maryland from Pennsylvania to West Virginia. The county is narrow in the middle, somewhat enlarged to the west, and greatly enlarged to the east. It is bounded on the west by Allegany County, on the east by Frederick County, on the north by Pennsylvania along the Mason-Dixon line, and on the south by the Potomac River. To the south, across the Potomac, Washington County faces parts of both Virginia and West Virginia. The land area is about 462 square miles, or 295,680 acres. This is the eighth largest county in the State, and it also ranks eighth in the proportion of land occupied by farms (*6*).

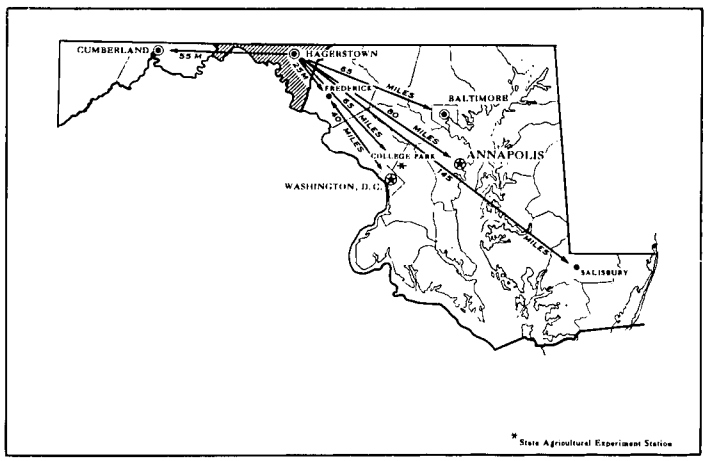


Figure 1.—Location of Washington County in Maryland.

Physiography and Relief

Washington County includes part of the western slope of the Blue Ridge; the broad Hagerstown Valley, which is part of the Great Limestone Valley system of the Eastern States; and a part of the Appalachian Mountain system. The Hagerstown Valley forms the eastern and central parts of the county, between the Blue Ridge and the Appalachian ridges and valleys. The highest point in the county is the crest of Quirauk Mountain of the Blue Ridge, which has an elevation of 2,145 feet. The Blue Ridge is steep. The Appalachian part of the county is a series of narrow ridges, which extend in a general northeast-southwest direction and are separated by narrow valleys. In the Appalachian area there are three outstanding ridges: Bear Pond Mountain at 2,000 feet, Fairview Mountain at 1,700 feet, and Sideling Hill at 1,600 feet.

The Hagerstown Valley occupies more than half of the county. It ranges in elevation from about 300 feet near the Potomac River to about 600 feet at the Pennsylvania line. The valley floor is nearly level to rolling, with some local hills and ridges.

[1] Numbers in italics in parentheses refer to Literature Cited, page 127.

Along the streams and rivers of the county, there are large areas of alluvial terraces and flood plains. The flood plains are nearly level and lie just above the normal stages of the streams. The terraces are older flood plains, now considerably above the streams and rivers.

Drainage

Washington County is entirely within the drainage system of the Potomac River and is traversed by a number of streams that flow generally southward. The most important of these are Israel Creek, Antietam Creek, Little Antietam Creek, Marsh Run, Downey Branch, Lanes Run, Conococheague Creek and its tributaries, Licking Creek, Tonoloway Creek, and Little Tonoloway Creek. Another important stream is Sideling Hill Creek, which forms the boundary with Allegany County.

From the standpoint of both soils and land conditions, Washington County is generally well drained. Some poorly drained and very poorly drained areas exist, but they are small and generally unimportant. There are no true swamps or marshes in the county.

Settlement and Population

The original settlers of Washington County came mostly from other parts of the colonies and were of English, Scotch, and Swiss descent. There were also some settlers from Alsace and other parts of northern France. Later immigrants included persons of German, Dutch, and Scotch-Irish nationality. Some farms were established in the county by 1735.

The county, which at first included all of western Maryland, was created in 1776. By 1800, the county was comparatively well settled, with commercial centers at Hagerstown and Williamsport. Early industry included many mills along Conococheague Creek and Antietam Creek.

In 1790, the population of Washington County was 15,822. By 1820, it was 23,720. In 1910, the total population of the county was 49,617 of which two-thirds was rural. The population of the county in 1950 was 78,886. The estimated population of the county in 1955 was 84,181. The official census of 1960 should show an additional increase. The population of Hagerstown in 1950 was 36,260.

Transportation and Markets

Washington County has excellent transportation facilities. Federal and interstate highways serve nearly all parts of the county and connect the county with other important areas. There is a good network of paved county and State roads and other all-weather roads. Railroads serving the county are the Baltimore and Ohio, the Western Maryland, the Norfolk and Western, and the Pennsylvania. Hagerstown has air-transportation facilities.

Many agricultural products are marketed within the county. Other markets of importance are Baltimore; Washington, D.C.; and Pittsburgh, Philadelphia, Harrisburg, and Lancaster in Pennsylvania.

Agriculture

Large areas of fertile and responsive soils and a temperate climate with fairly well distributed rainfall and a fairly long growing season are favorable to agriculture in Washington County. Most of the soils are well suited to general farming and to livestock production, and some soils are especially well suited to fruit farming. Agriculture is diversified, and the economic level of agriculture is high.

In the following pages, facts about crops grown in the county, pastures, livestock and poultry, types and sizes of farms, farm tenure, and farm power and mechanical equipment are discussed. The statistics used are from reports published by the U.S. Bureau of the Census.

Crops

Data from the census of 1954 on acreages of the most important field crops, numbers of fruit trees, and numbers of berry farms are given in table 1. In 1954, the most extensive field crop in the county was corn for grain. Other crops are wheat for grain; clover, timothy, and mixed hay; and alfalfa. Outstanding in the county are the orchard crops; Washington County leads the State in production of apples, peaches, plums, and cherries. Grapes, strawberries, and miscellaneous berries are also important crops. The total cropland harvested in 1954 was 104,609 acres, or 35 percent of the county area. Washington County was third in the State in total cropland harvested.

TABLE 1.—*Acreage of principal crops and numbers of fruit trees, grapevines, and berry farms in 1954*

Crop	Unit	Rank in State
	Acres	
Corn for grain	23, 912	9
Corn for silage	6, 269	3
Wheat harvested	17, 592	3
Oats harvested	5, 812	4
Barley harvested	8, 980	2
Alfalfa hay	12, 422	2
Clover, timothy, and mixed hay	14, 900	7
Vegetables for sale	979	16
	Number	
Apple trees of all ages	267, 213	1
Peach trees of all ages	156, 676	1
Prune and plum trees of all ages	9, 738	1
Cherry trees of all ages	8, 624	1
Pear trees of all ages	1, 990	2
Grapevines of all ages	868	7
Farms producing strawberries	52	7
Farms producing other berries	126	3
	Quarts	
Strawberries harvested	27, 000	5

Pastures

A total of 66,264 acres was grazed in 1954. Of this total, 21,696 acres was cropland used temporarily for pasture, and 8,004 acres was grazed woodlands. This

leaves 36,564 acres, presumably in permanent pastures, most of which are improved.

Livestock and Poultry

The general nature and the diversification of agriculture in Washington County are emphasized by the data on livestock and poultry in table 2. Livestock and poultry are highly important parts of the agriculture. Not shown in the table is the fact that most kinds of livestock increased in number and in value between 1949 and 1954. Exceptions were horses, mules, swine, and sheep.

TABLE 2.—*Number and value of livestock and poultry and their products in 1954*

Livestock and livestock products	Number	Rank in State	Value in dollars	Rank in State
Cattle and calves on farms	40, 489	5	(1)	(1)
Milk cows	18, 267	3	(1)	(1)
Heifers and heifer calves	12, 318	5	(1)	(1)
Cattle and calves sold alive	19, 140	5	(1)	(1)
Whole milk sold	(1)	(1)	4,253,510	3
Cream sold	(1)	(1)	33, 383	4
Horses and mules on farms	1, 245	6	(1)	(1)
Hogs and pigs on farms	17, 149	3	(1)	(1)
Hogs and pigs sold alive	17, 581	3	577, 857	5
Sheep and lambs on farms	4, 267	3	(1)	(1)
Sheep and lambs sold alive	2, 889	3	44, 579	3
Chickens (over 4 months) on hand	157, 832	3	(1)	(1)
Broilers sold	478, 378	7	363, 904	7
Other chickens sold	87, 911	3	92, 225	1
Chicken eggs sold—dozens	989, 443	3	391, 475	3
Turkeys raised	18, 675	9	(1)	(1)
Ducks raised	2, 977	6	(1)	(1)
Value of poultry and products sold	(1)	(1)	949, 578	6

[1] Not reported.

Types and Sizes of Farms

In 1954, 213,104 acres, or about 72 percent of the county, was in farms. There were 1,934 farms having an average size of about 110 acres. Of the land in farms, 133,849 acres was classed as cropland. Nearly 83 percent of this cropland was used for corn, small grains, hay crops, or pasture, leaving only about 17 percent for all other crops.

As to types of farms, dairy farms were the most common, 35 percent being so classified. A total of 10 percent was listed as other livestock farms, 6 percent as cash-grain farms, about 5 percent as poultry farms, and 3 percent as fruit farms. The remaining farms were listed as miscellaneous or unclassified.

In 1954, there were 287 farms of less than 10 acres each. Then there were 474 farms of 10 to 49 acres, 321 farms of 50 to 99 acres, 824 farms of 100 to 499 acres, and only 28 farms of 500 or more acres. There were 1,225 commercial farms, 215 part-time farms, and 490 residential farms. The rest were unclassified as to status.

Farm Tenure

Full owners operated 72 percent of the farms in 1954. In addition, 9 percent were operated by part owners, about 18 percent by tenants, and less than 1 percent by managers. Most tenancy was by shares, but somewhat more than 30 percent was on a cash basis.

Farm Power and Mechanical Equipment

In 1954, 1,245 horses and mules were on 598 farms. Although these animals are used mainly for workstock, mechanized equipment is more important than horses and mules on the average farm.

There was a total of 2,257 tractors reported on 1,360 farms. Mostly of the wheeled variety, these were used for nearly all farm operations. Included were 352 garden tractors and 42 tractors of crawler type. Also reported on farms in 1954 were 1,201 trucks, 2,199 automobiles, 324 pickup hay balers, 302 cornpickers, and 126 forage harvesters. In addition, milking machines were reported on 578 farms and power feed grinders on 534 farms.

How the Soil Survey Was Made

Soil scientists examined soils in every field and parcel of land in the county. To examine the subsoil and deeper layers, they bored holes with an auger or dug with a spade. They also studied soils in banks, roadcuts, and in pits and other excavations.

Each boring or hole reveals a soil profile. Each profile consists of one or more distinct layers, called horizons, over a substratum of hard or soft rock, gravel, river sediments, or some other material. Soil scientists designate different kinds of horizons by capital letters. The A horizon is the upper layer just beneath the leaf litter or the vegetation. It consists of the surface soil and, in some places, a subsurface soil. The B horizon is a subsoil that has developed as a result of the processes of soil formation. The C horizon is the parent material from which the soil has been formed. The D horizon is a substratum beneath the C horizon, or beneath the A or the B horizon if some of the other layers are missing. It may not be the same kind of material as that from which the soil itself has been formed.

Each major horizon, A, B, C, or D, may consist of one to many minor horizons or subhorizons, each different from the other. Thus, one soil may have A_1, A_2, B_{21}, B_{22}, and C horizons; another soil may have A_1, BC, and D_r horizons; and yet another, A_1, B_1, B_2, C, and D horizons. The properties and thicknesses of the various horizons and their arrangement help to characterize and classify the soil.

Properties, such as texture and color, generally vary in the different horizons of soil. In Washington County the surface layer in most soils is darker in color than the lower layers; the subsoil layers are brighter and more intensely colored; and, in the lower horizons, mottled colors may be present. The characteristics described in the following paragraphs are among the more important ones considered by soil scientists. Soils are described according to the "Soil Survey Manual" (*9*).

Texture refers to the content of clay, silt, and sand. Texture is judged by the feel and, to some extent, by the appearance of the soil, and also can be checked by mechanical analysis in the laboratory. The finest particles are clay. Individual clay particles are so fine that they can scarcely be seen through a microscope. Soils that consist principally of clay are typically plastic and sticky when wet and rather hard when dry. Water moves slowly through clay soils. These soils retain moisture and plant nutrients well.

Medium-sized particles, large enough to be seen with a microscope, are called silt. Silty soils are smooth and velvety, and some are silky to the touch. They are usually not so hard when dry, nor so sticky and plastic when wet, as clay soils.

The larger particles, smaller than gravel, are called sand. Individual sand particles can be seen with the naked eye. Water moves rapidly through sandy soils, but such soils retain relatively little water for plants. Many soils of Washington County also contain gravel, and some contain stones. Some areas have many outcroppings of rock, although these do not directly affect the soil texture.

Most soils contain variable amounts of clay, silt, and sand. Few soils anywhere are pure silt or pure sand, and none are known that are pure clay. Within any one soil, the different horizons may have different proportions of clay, silt, and sand.

Structure is the arrangement of individual soil particles into clumps or aggregates. Some soils are loose and crumbly; others can be broken down into small blocklike clods; and still others may have small, flattened, platelike aggregates. The structure of a soil helps determine whether air, water, and plant roots can penetrate it easily or with difficulty. Structure varies between soils, and sometimes it is quite different in the various horizons of the same soil.

Color indicates other soil properties. The darker colored soils are generally higher in organic matter than the lighter colored soils. Other things being equal, they are more productive and more easily tilled than the lighter colored soils. Color also indicates the degree of natural drainage in a soil. In Washington County well-drained soils are normally reddish brown, yellowish brown, brownish yellow, reddish yellow, yellowish red, or red. Poorly drained soils have subsoils that are gray and generally are mottled with brown, yellow, or red. Intermediate classes of natural drainage are defined according to the amount and location of mottling.

Wetness of an area and the color of the soil and its position in the landscape are factors that indicate degree of *drainage*. In Washington County there is a wide variation in drainage, and this variation is a major cause of differences in crop suitability and other properties. The terms used to denote the successive grades or degrees of soil drainage are *excessively drained*, *somewhat excessively drained*, *well drained*, *moderately well drained*, *somewhat poorly drained*, *poorly drained*, and *very poorly drained*.

Acidity and other chemical properties indicate the ways in which the soils were formed and how productive the soils may be.

Different combinations of these soil characteristics are the bases for separating one soil from another. In determining the kinds of soil mapped in the county, combinations of soil properties are emphasized that are important in agriculture and in other soil uses and management. The kinds of soil are then grouped into soil series, types, and phases.

A *soil series* is a group of soils that, except for the texture of the surface layer, have the same profile characteristics and the same general range in color, structure, consistence, and sequence of horizons. All soils of the same series have developed from the same kind of parent material. Variations in slope or in other features are permitted so long as such variations do not affect the profile characteristics. Each soil series is given a name that is generally taken from the locality where the series was first recognized and described. Thus, Hagerstown soils make up a very important series that was first described and recognized in Washington County many years ago.

A *soil type* is a subdivision of a soil series. The texture of the surface soil determines the type within a series. A series may consist of only one or of many types. Thus, Pope fine sandy loam and Pope silt loam are soil types within the Pope series.

Variations within a soil type—chiefly in such external characteristics as surface slope, stoniness, or accelerated erosion—are designated as *soil phases*. Waynesboro gravelly loam, 8 to 15 percent slopes, moderately eroded, and Waynesboro gravelly loam, 15 to 25 percent slopes, severely eroded, are two of the phases named according to slope and degree of erosion within the soil type, Waynesboro gravelly loam, in Washington County. If erosion has been negligible or slight, it is not mentioned in the soil phase name, but if it has been moderate, severe, or very severe, the soils are so named. When this report mentions this or that "soil" it refers to the soil phase, which is the mapping unit used in Washington County.

The terms gravelly, channery, shaly, stony, or rocky also are used to describe phases of soil types. For example, one of the soils shown on the map is Hazel channery silt loam, 10 to 20 percent slopes, severely eroded.

Some of the soil mapping units contain more than one kind of soil. Inclusions of less than 15 percent of different, or even of contrasting soils, are not indicated in the soil name. Significant inclusions are mentioned in "Description of the Soils."

A few mapping units consist of two or more kinds of soil so intricately mixed that the separate bodies of them cannot be shown at the scale of mapping. Such mixed areas are called soil complexes. An example is the mapping unit called Calvin-Berks channery loams, 0 to 10 percent slopes, moderately eroded.

Another kind of mapping unit contains two or more soils that are similar and that were not mapped separately. An example is the mapping unit, Edgemont and Laidig very stony loams, 0 to 5 percent slopes.

Some of the mapping units are not true soils but can be called land types. Examples are Rocky eroded land, Stony steep land, and Terrace escarpments.

Soils and Their Relation to Topography

The soils of Washington County can be considered in four broad groups according to their position on the landscape. They are soils of the uplands, soils of old colluvial deposits, soils of the old stream terraces, and soils of the flood plains. Within these broad topographic groups, the soils vary according to the parent materials from which they developed and according to their drainage. Table 3 shows these relationships among the soil series in the county.

Soils of the uplands.—About 71 percent of the land area of the county consists of uplands. The soils there developed in place from materials weathered from the underlying rock.

Soils of old colluvial deposits.—About 16 percent of the county area consists of soils that developed on materials transported by gravity. These materials have moved down the sides of slopes, filling many depressions and drainageways, and spreading fanlike over valley floors. In places they cover areas that extend outward for a considerable distance from the area where they originated. Thus, the soils in those places were not developed from materials weathered from the underlying rocks.

Soils of old stream terraces.—These soils are mostly on old high terraces along the Potomac River, although some are on terraces of some of the larger creeks. The terraces were once flood plains, but they are well above the present stream channels, and some are at a considerable distance from the present streams. Alluvium was deposited on these flood plains when the streambeds were at a higher level than at present. The soils on these old terraces make up about 5 percent of the county.

Soils of the flood plains.—The alluvial deposits on flood plains are fairly recent. Most of these areas are still flooded at times. In many places the soils do not contain developed horizons, but in some places a weak B horizon has developed. The kind of soil depends chiefly on the kinds of rocks and soils from which the material was washed, and on the drainage. These soils of the flood plains make up the remaining 8 percent of the county.

General Soil Areas

In a county or other large area, it is fairly easy to see differences in the landscape from place to place. Some of the more obvious differences are in the shape, steepness, and length of slopes; in the width, volume, and speed of streams and the size and shape of their valleys; and in the kind and vigor of wild vegetation and of the crops and pastures. Less obvious differences are in the kinds of soils that have developed and the patterns in which they occur in the landscape.

By drawing lines around the different patterns of soils on a small map, we get a general map of the soils. Such a map is useful to those who want a general idea of the soils, who want to compare different parts of the county, or who want to locate large areas suitable for some particular kind of farming or other general use. It does not show accurately the kinds of soils on a single farm or small tract.

In Washington County there are 14 general soil patterns, called soil associations. These are shown on the colored general soil map at the back of this report. Each association is named for the dominant soil series. The 14 associations are grouped into 4 divisions, according to drainage and depth of the soils.

Well-Drained, Stony and Very Stony Soils

This division occupies about 10 percent of the county. It contains three soil associations, which are on high ridges and low mountains, from South Mountain in the east to Sideling Hill in the west.

1. Dekalb-Leetonia-Edgemont-Laidig association (Very stony, mountainous soils)

This soil association consists of moderately coarse textured to medium textured, very stony soils developed from sandstones and quartzites. Most of the soils are fairly shallow to bedrock. The dominant soils are those of the Dekalb, Leetonia, Edgemont, and Laidig series, but small areas of other soils are included. Besides being shallow and stony, these soils are mostly on steep, mountainous terrain, are strongly to very strongly acid, and are rather low in fertility and productivity.

These soils are probably more suitable for forestry and wildlife than for more intensive agricultural uses, but this does not mean that they are good forest soils. In fact, forest operations may not be economically feasible on some of the rougher and stonier areas. This association occupies about 8.6 percent of the county.

2. Dekalb-Highfield association (Very steep, stony soils)

This soil association consists of very stony soils of the Dekalb and Highfield series, developed on sandstone and greenstone (metabasalt), respectively. Where the Highfield soils dominate, these stony soils are somewhat deeper and more productive than those of the Dekalb-Leetonia-Edgemont-Laidig association.

Except in the very steepest mountainous parts, this Dekalb-Highfield association should be of economic use for forests or timber products. It is too stony for cultivation or for any but very limited grazing. This association makes up about 0.6 percent of the county.

3. Highfield-Fauquier association (Deep, stony soils)

This association is of deep, stony soils developed almost entirely from greenstone or metabasalt. Although these soils are too stony for crops or for very intensive grazing, they have considerable depth, comparatively low acidity, and fair fertility and productivity. Thus, they probably make up the best group of soils limited in use mainly to forestry, and timber production on them should be economically feasible. This association makes up about 1.1 percent of the county.

Well to Excessively Drained, Shallow, Medium-Textured Soils

This second major division of soil associations makes up about one-fourth of the entire county. This division is not confined to mountainous areas, but it is fairly well distributed in various parts of the county. Where the

TABLE 3.—*Relationships of the soil series according to topographic position, parent material, and drainage*

Position and parent material	Drainage class						
	Excessively drained	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
Uplands:							
Metamorphic rocks:							
Metabasalt (greenstone)			Fauquier, Highfield, Myersville.				
Micaceous schists and phyllites	Hazel	Chandler	Chandler, Talladega.				
Quartzite or quartzitic sandstone			Edgemont [1]				
Consolidated sedimentary rocks:							
Nearly pure, massive limestone			Hagerstown				
Limestone and shale			Duffield, Frankstown.				
Cherty limestone			Dunmore, Frederick.				
Very cherty limestone			Elliber				
Sandy or arenaceous limestone			Benevola				
High-calcium argillaceous limestone.		Corydon	Corydon				
Interbedded limestone, sandstone, and shale.			Westmoreland				
Slightly calcareous, gray shales	Litz	Litz					
Slightly calcareous, red shales and sandstones.	Teas	Teas					
Acid, gray to yellow, hard shales	Montevallo						
Acid, yellow to brown, soft shales		Berks	Berks				
Acid, red shales and sandstones		Calvin	Calvin				
Acid, red sandstones	Lehew	Lehew					
Gray to yellow, coarse-grained, acid sandstones.	Dekalb, Leetonia.						
Old colluvial deposits:							
Crystalline rock materials			Braddock, Thurmont.	Trego		Rohrersville. [2]	
Sandstone materials			Laidig	Buchanan			
Sandstone and shale over limestone materials.			Murrill				
Cherty limestone materials				Landisburg			
Acid shale materials				Leadvale		Brinkerton	
Old stream terraces:							
Limestone materials			Ashton, Etowah.				
Acid sandstone and shale materials.			Holston, Waynesboro.	Monongahela.		Tyler	
Bottom lands and flood plains:							
Crystalline rock materials			Congaree	Chewacla		Wehadkee	
Gray, yellow, and brown sandstone and shale materials.			Pope		Philo	Atkins	
Red sandstone and shale materials.				Largent		Atkins	
Limestone materials			Huntington	Lindside		Melvin	Dunning
Marl deposits				Warners	Warners	Warners	

[1] The Edgemont series includes some soils developed partly on colluvial materials, and may be difficult to distinguish from soils of the Laidig series.

[2] The surface layer of the Rohrersville soils is more or less strongly influenced by recent, fine-grained local alluvium.

soils are not too severely eroded, they are suitable for cultivated crops. Some of the soils are productive, especially for special crops, such as peaches or apples. For general crops, however, productivity is rather low because the soils are shallow and some of them are droughty.

4. Berks-Montevallo association (Soils on shale)

Two series, the Berks and the Montevallo, dominate this association. There are a few included minor soils, such as those of the Brinkerton series. The Berks-Montevallo association occupies a belt that extends in a north-and-south direction across the county. It is centered on Conococheague Creek, with smaller areas on the Potomac west of Downsville.

This association consists mainly of soils on shale. The soils are acid, shallow, and somewhat droughty, but they can be fairly easily managed, can be plowed deeply into the shale, if necessary, and are fairly productive under the best management. The Berks-Montevallo association makes up about 5.1 percent of the county.

5. Hazel-Chandler association (Shallow soils on schist)

The Hazel-Chandler association consists chiefly of shallow and very shallow, very acid soils developed from mica schist and phyllites. The largest area extends northward from the Potomac River, across from Harpers Ferry, W. Va., almost to McClellans Lookout; a smaller area is on both sides of U.S. Highway No. 40, just west of the Frederick County Line.

In general, these soils are so shallow and of such limited productivity that they are little used, although there are occasional cropped areas, pastures, and orchard plots. The Hazel-Chandler association occupies about 1.7 percent of the county.

6. Talladega association (Moderately deep soils on schist)

On the western slope of South Mountain, from a point just below Zittlestown to one just east of Rohrersville, is an area occupied mostly by soils of the Talladega series. This area is known as the Talladega association. The soils are similar to those of the Hazel-Chandler association, but they are somewhat deeper and thus have better moisture relationships. There is usually considerable quartzite gravel on and in the upper part of the soil.

Because of its position, much of this soil association is used for fruit crops, especially berries, to take advantage of the good air drainage on the mountain slopes. Otherwise, general farming is the pattern, but there are many steep or eroded areas that are strongly limited in their usefulness for agriculture. The Talladega association makes up about 1 percent of the county.

7. Litz-Teas association (Shallow, steep soils on shale)

This area on the general soil map is the Litz-Teas association. It consists of one long, narrow ridge, extending southward from the Pennsylvania line through Ringgold to a point about 2 miles northwest of Smithsburg. The soils of the Litz-Teas association are shallow, mostly fairly steep, and underlain by nonacid, reddish and gray shales.

Although fertility is not especially low, the soils are droughty and thus are not very productive. Most of them are in cultivation. There are a number of orchards on soils of this association. The association makes up only about 0.2 percent of the entire county.

8. Calvin-Berks-Litz-Montevallo association (Shallow soils on shale, limestone, or sandstone)

This is the most extensive soil association in the division of shallow soils. It makes up more than 16 percent of the county and extends, with some interruptions, from the Allegany County line in the west to Fairview Mountain. This is also the most complex of the soil associations in the county. There are smaller areas of many soil series included besides those given in the association name. Some of the soils developed from acid or nonacid shale, and others, from limestone of various degrees of purity, from sandstone, or from mixtures of any of these.

Most soils within this area are shallow to bedrock, but there are spots of deeper Frederick, Dunmore, and Westmoreland soils. Most of the soils are of medium texture, but some are moderately coarse textured. Because this association lies within the Appalachian Valley and Ridge province, the areas are mostly on fairly sharp ridges that are separated by rather deep, small streams that flow into the Potomac River.

Agriculture on the Calvin-Berks-Litz-Montevallo association is mostly of a general nature, with the greatest emphasis, perhaps, on fruit growing. Peach and apple orchards occupy many areas, particularly areas underlain by limestones and nonacid shales. However, the greater part of the association is in forest. The forests are primarily of hardwood trees, dominantly oaks.

Moderately Well to Well Drained, Deep, Medium-Textured Soils

This major division of the soils of Washington County includes most of the recent and older alluvial soils of the flood plains and terraces. The soils are mostly medium textured and deep, but there are variations in drainage. Most of the soils are at least moderately well drained. This division makes up about 2 percent of the county.

9. Holston-Monongahela-Huntington-Lindside association (Soils on broad flood plains and terraces)

This is the only soil association of this major division. It consists of soils of the flood plains and of large parts of the terraces of the Potomac River. The Holston soils are well drained and the Monongahela soils are moderately well drained soils of the terraces. They developed from very old, acid sediments. The Monongahela soils have a strongly developed siltpan or fragipan horizon in their subsoil, and this restricts drainage.

The Huntington and Lindside soils are on recent flood plains that consist of sediments influenced by limestone. The Huntington soils are well drained, but the Lindside

599533—62——2

soils have a seasonally high water table and are only moderately well drained. There are smaller areas of other soils, such as the Tyler and Waynesboro soils on the terraces and the Atkins, Philo, and Pope soils on the flood plains.

Agriculture is fairly well developed on the soils of the Holston-Monongahela-Huntington-Lindside association. Most of it is general farming. The Holston and Monongahela soils are above normal flood stages of the Potomac, but both are subject to erosion. The Monongahela soils are considered cold because of the impeded drainage. The Huntington and Lindside soils may be flooded by the Potomac at high-water stages, and the Lindside soils also are somewhat wet and cold. This association makes up about 2.2 percent of the county.

Well-Drained, Deep, Medium-Textured Soils

This is by far the most extensive and important major division of the soil associations in Washington County. The soils vary in many characteristics, but they are all deep, well drained, and of medium texture. These soils are highly suitable for agriculture wherever they are not too strongly limited by steep slopes or by aggravated erosion. They are also suitable for most nonagricultural purposes. There are 5 distinct soil associations in this division. Together they make up nearly 63 percent of the entire county.

10. Braddock-Thurmont-Edgemont-Laidig association (Gravelly soils)

The soils of this association are in foot-slope positions below mountains or ridges. They have been formed in colluvial, acid rock debris and are mostly rather gravelly. The gravel sometimes hinders cultivation or creates other management problems, but it in no way affects the suitability or the capability of the soils.

Because of their position in relation to ridges, these soils have good air drainage. Therefore, they are used rather extensively for orchards and berry crops, particularly in the northeastern part of the county between the Pennsylvania State line and Cavetown. They are also used for general crops and pastures, and some rather large areas are still in forests. About 4.2 percent of the county is occupied by the soils of this association.

11. Waynesboro association (Soils on high terraces along the Potomac River)

This association consists almost entirely of the soils of one series, the Waynesboro, with only small areas of other soils. The Waynesboro soils consist of very old, acid alluvium, mostly gravelly, which has been deposited in rather thick beds above the Potomac River. These materials are so thick that any underlying stratum, whether it be older alluvium, limestone, or other material, has had no evident effect on the soil.

These soils are used for all the crops common to the county, except orchards. They generally lack the air drainage that is needed for fruit crops. The soils of the Waynesboro association are probably somewhat less productive than the soils of the other associations in this division. The association occupies about 2.4 percent of the county. It occupies rather small areas at various points on the high terraces of the Potomac River, from the vicinity of Four Locks downstream to a point just southwest of Sharpsburg.

12. Fauquier-Myersville-Highfield association (Soils on greenstone)

This association is made up almost entirely of deep, well-drained, medium-textured soils that developed in the weathered residue of greenstone rocks. Because these rocks are rich in basic minerals, the soils developed from them are less acid and contain more plant nutrients than many of the soils of the county. The most important area of the Fauquier-Myersville-Highfield association is in Pleasant Valley, which is drained by Israel Creek. It is in the extreme southeastern part of the county. Smaller areas are at higher elevations in the extreme northeastern part of the county, in the general area between Harman Gap and Highfield.

The soils of this association are used for all the crops of the area, including orchards and pastures. The association occupies about 3.7 percent of the county.

13. Murrill association (Well-drained soils on colluvial deposits that contain lime)

Wherever high ridges of acid rocks are next to the great limestone valley of Washington County, colluvial material has moved downslope and out over the fringes of the valley. The forces that have caused this movement are mostly gravity, assisted by the flow of runoff waters over very long periods of time. Wherever the underlying limestone materials are close enough to the surface of the land to affect soil development, one series of soils, the Murrill, is extensive. There we have the Murrill association, made up almost entirely of soils of the one series.

The soils of this association occur on the lowest western slopes of South Mountain, from the Pennsylvania line southward almost to Rohrersville. They are also on the lowest western slopes of Elk Ridge from near Porterstown southward to the Potomac River; in a small isolated area just north of Antietam; and in a large area on the lowest eastern slopes of Fairview Mountain, from the Pennsylvania line southward beyond Clear Spring and southeastward to the Potomac in the vicinity of Two Locks. The Murrill association makes up altogether about 6.5 percent of the county.

The Murrill association is important in the agriculture of the county. Because the soils are underlain by limestone and are influenced by limestone materials, they are more productive than most of the soils on other materials. General farming is the common pattern, with emphasis on dairying and other livestock enterprises. There are some orchards, but they are not so common as on the somewhat higher intermediate slopes where air drainage is usually somewhat better. Only small and unimportant areas within the Murrill association remain in forests.

14. Hagerstown-Duffield-Frankstown association (Soils of limestone valleys)

This soil association occupies most of the main basin of the great limestone valley that crosses the county between South Mountain and Fairview Mountain. At least 90 percent of the association is occupied by soils

of the Hagerstown, Duffield, and Frankstown series. Other locally important series within the same area are the Benevola, Corydon, Etowah, Huntington, Lindside, Melvin, Dunning, and Warners, but their total area is insignificant in comparison to the soils of the three dominant series. Altogether the Hagerstown-Duffield-Frankstown association accounts for more than 46 percent of Washington County, thus dominating the agriculture, not only of the valley but also of the entire county.

The Hagerstown soils are red and have been developed from more or less pure, massive limestone in the valley. The Duffield and Frankstown soils are more yellowish. The Duffield soils have been developed from interbedded limestones and soft shales, sometimes known as shabby limestones, and the Frankstown soils, from impure limestones containing some shale and cherty gravel and thin beds of sandstone. The Duffield soils are somewhat deeper than the Frankstown. The soils of these three series are fertile and are productive under good management.

There is a major variation within the Hagerstown-Duffield-Frankstown association that is not shown on the general soil map. Rock outcrops are fairly common in all of these soils. In large parts of the valley, outcropping ledges of limestone are so numerous that they are shown on the larger detailed soil map as very rocky or extremely rocky phases of the soils. In such very rocky or extremely rocky areas, the soils are deep between the outcrops, except where some of the ledges lie from a few inches to a foot or more below the surface. This rockiness, of course, limits the usefulness of the soils. These limitations are discussed more fully in the section "Use and Management of Soils."

Because they are both productive and extensive, the soils of the Hagerstown-Duffield-Frankstown association are the most important ones in the agricultural economy of the county. These soils are used for all crops, with great emphasis on corn, small grains, hay crops, and pastures. Because of this pattern, plus relative nearness to the great eastern markets, dairying is the most important type of enterprise; next in importance are the other livestock operations. Under good management, yields of all crops are high. The chief deterrent to even greater production, as already indicated, is the presence of large areas of outcropping limestone rocks. Even these areas, where cultivation is hindered or in some places prevented, are useful for pastures and for some hay crops.

All of the soils of the county, whether or not they have been named in this discussion of the general areas, are described in detail in the next section of this report.

Description of the Soils

In this section the soils and land types in Washington County are described in detail. For each series of soils, one typical profile is described. Differences among soils in the same series are noted in the descriptions of the mapping units. Most commonly, the differences are in slope and in the degree of erosion or in the texture of the surface layer.

The location and distribution of the individual soils are shown on the soil map in the back of this report. The approximate acreage and proportionate extent of each soil are shown in table 4. Many terms used in describing the soils are defined in the Glossary. A more detailed account of the origin of the soils is in the section "Formation and Classification of Soils."

TABLE 4.—*Approximate acreage and proportionate extent of soils*

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Ashton fine sandy loam, 0 to 5 percent slopes	78	(1)	Berks silt loam, ridges, 10 to 20 percent slopes, severely eroded	304	0.1
Atkins silt loam	1,164	0.4	Berks silt loam, ridges, 20 to 30 percent slopes, moderately eroded	273	.1
Benevola clay loam, 0 to 3 percent slopes	159	.1	Berks soils, ridges, 20 to 45 percent slopes, severely eroded	823	.3
Benevola clay loam, 3 to 8 percent slopes, moderately eroded	412	.1	Berks soils, ridges, 30 to 60 percent slopes	3,987	1.3
Benevola clay loam, 8 to 15 percent slopes, moderately eroded	176	.1	Braddock and Thurmont gravelly loams, 3 to 8 percent slopes, moderately eroded	575	.2
Benevola clay loam, 8 to 15 percent slopes, severely eroded	65	(1)	Braddock and Thurmont gravelly loams, 8 to 15 percent slopes, moderately eroded	567	.2
Berks channery loam, ridges, 0 to 10 percent slopes, moderately eroded	815	.3	Braddock and Thurmont gravelly loams, 15 to 25 percent slopes	74	(1)
Berks channery loam, ridges, 10 to 20 percent slopes, moderately eroded	879	.3	Brinkerton silt loam, 0 to 8 percent slopes	236	.1
Berks channery loam, ridges, 10 to 20 percent slopes, severely eroded	194	.1	Buchanan gravelly loam, 0 to 3 percent slopes	77	(1)
Berks channery loam, ridges, 20 to 30 percent slopes, moderately eroded	632	.2	Buchanan gravelly loam, 3 to 8 percent slopes, moderately eroded	866	.3
Berks shaly silt loam, 0 to 8 percent slopes	1,002	.3	Buchanan gravelly loam, 8 to 15 percent slopes, moderately eroded	562	.2
Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded	2,606	.9	Buchanan gravelly loam, 15 to 25 percent slopes, moderately eroded	86	(1)
Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded	2,381	.8	Calvin channery fine sandy loam, 3 to 10 percent slopes, moderately eroded	276	.1
Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded	352	.1	Calvin channery loam, 3 to 10 percent slopes, moderately eroded	890	.3
Berks silt loam, ridges, 0 to 10 percent slopes, moderately eroded	695	.2	Calvin channery loam, 10 to 20 percent slopes, moderately eroded	1,978	.7
Berks silt loam, ridges, 10 to 20 percent slopes, moderately eroded	391	.1			

TABLE 4.—*Approximate acreage and proportionate extent of soils*—Continued

Soil	Area	Extent
	Acres	*Percent*
Calvin channery loam, 20 to 30 percent slopes	651	0. 2
Calvin channery loam, 20 to 30 percent slopes, moderately eroded	224	. 1
Calvin channery loam, 30 to 45 percent slopes	859	. 3
Calvin channery loam, 45 to 60 percent slopes	156	. 1
Calvin shaly loam, 0 to 10 percent slopes, moderately eroded	189	. 1
Calvin shaly loam, 10 to 20 percent slopes, moderately eroded	126	(1)
Calvin shaly loam, 10 to 20 percent slopes, severely eroded	118	(1)
Calvin shaly loam, 20 to 30 percent slopes	112	(1)
Calvin shaly loam, 30 to 45 percent slopes	204	. 1
Calvin-Berks channery loams, 0 to 10 percent slopes, moderately eroded	1, 565	. 5
Calvin-Berks channery loams, 10 to 20 percent slopes, moderately eroded	2, 798	. 9
Calvin-Berks channery loams, 3 to 20 percent slopes, severely eroded	320	. 1
Calvin-Berks channery loams, 20 to 30 percent slopes, moderately eroded	1, 289	. 4
Calvin-Berks channery loams, 30 to 60 percent slopes, moderately eroded	1, 315	. 4
Calvin-Montevallo shaly loams, 0 to 10 percent slopes, moderately eroded	103	(1)
Calvin-Montevallo shaly loams, 10 to 20 percent slopes, moderately eroded	178	. 1
Calvin-Montevallo shaly loams, 20 to 30 percent slopes, moderately eroded	163	. 1
Calvin-Montevallo shaly loams, 20 to 45 percent slopes, severely eroded	134	(1)
Calvin-Montevallo shaly loams, 30 to 60 percent slopes	255	. 1
Chandler silt loam and channery silt loam, 0 to 10 percent slopes	143	(1)
Chandler silt loam and channery silt loam, 3 to 10 percent slopes, moderately eroded	360	. 1
Chandler silt loam and channery silt loam, 10 to 20 percent slopes, moderately eroded	342	. 1
Chandler silt loam and channery silt loam, 20 to 30 percent slopes	97	(1)
Chewacla gravelly sandy loam	206	. 1
Chewacla silt loam	311	. 1
Chewacla stony silt loam	157	. 1
Congaree silt loam and gravelly loam	86	(1)
Corydon clay loam, 0 to 3 percent slopes	309	. 1
Corydon clay loam, 3 to 8 percent slopes, moderately eroded	1, 006	. 3
Corydon clay loam, 8 to 15 percent slopes, moderately eroded	200	1
Corydon extremely rocky clay loam, 0 to 15 percent slopes	405	. 1
Corydon very rocky clay loam, 3 to 45 percent slopes, moderately eroded	857	. 3
Dekalb and Leetonia very stony sandy loams, 0 to 25 percent slopes	1, 762	. 6
Dekalb and Leetonia very stony sandy loams, 25 to 45 percent slopes	1, 056	. 4
Dekalb and Leetonia very stony sandy loams, 45 to 60 percent slopes	201	. 1
Dekalb and Lehew very stony loams, 0 to 25 percent slopes	281	. 1
Dekalb and Lehew very stony loams, 25 to 45 percent slopes	493	. 2
Duffield extremely rocky silt loam, 0 to 15 percent slopes	1, 279	. 4
Duffield silt loam, 0 to 3 percent slopes	3, 352	1. 1
Duffield silt loam, 3 to 8 percent slopes, moderately eroded	16, 338	5. 5
Duffield silt loam, 8 to 15 percent slopes, moderately eroded	4, 739	1. 6
Duffield silt loam, 8 to 25 percent slopes, severely eroded	99	(1)
Duffield silt loam, 15 to 25 percent slopes, moderately eroded	669	0. 2
Duffield very rocky silt loam, 3 to 15 percent slopes	1, 895	. 6
Duffield very rocky silt loam, 8 to 45 percent slopes, moderately eroded	178	. 1
Dunmore cherty silt loam, 3 to 8 percent slopes, moderately eroded	44	(1)
Dunmore cherty silt loam, 8 to 15 percent slopes, moderately eroded	50	(1)
Dunning and Melvin silty clay loams	1, 896	. 6
Edgemont and Laidig channery loams, 0 to 12 percent slopes	1, 493	. 5
Edgemont and Laidig channery loams, 5 to 20 percent slopes, moderately eroded	4, 613	1. 6
Edgemont and Laidig channery loams, 20 to 35 percent slopes, moderately eroded	2, 870	1. 0
Edgemont and Laidig channery loams, 35 to 60 percent slopes, moderately eroded	291	. 1
Edgemont and Laidig very stony loams, 0 to 5 percent slopes	127	(1)
Edgemont and Laidig very stony loams, 5 to 35 percent slopes	12, 524	4. 2
Edgemont and Laidig very stony loams, 35 to 60 percent slopes	771	. 3
Elliber cherty loam, 5 to 12 percent slopes, moderately eroded	520	. 2
Elliber cherty loam, 12 to 25 percent slopes, moderately eroded	719	. 2
Elliber cherty loam, 25 to 45 percent slopes, moderately eroded	629	. 2
Elliber cherty loam, 45 to 55 percent slopes	81	(1)
Eroded land, greenstone materials	101	(1)
Eroded land, limestone materials	617	. 2
Eroded land, sandstone and quartzite materials	221	. 1
Eroded land, shale and schist materials	3, 890	1. 3
Etowah gravelly loam, 0 to 3 percent slopes	97	(1)
Etowah gravelly loam, 3 to 8 percent slopes, moderately eroded	363	. 1
Etowah gravelly loam, 8 to 15 percent slopes, moderately eroded	182	. 1
Etowah gravelly loam, 15 to 25 percent slopes, moderately eroded	40	(1)
Etowah silt loam, 0 to 3 percent slopes	154	. 1
Etowah silt loam, 3 to 8 percent slopes, moderately eroded	339	. 1
Etowah silt loam, 8 to 15 percent slopes, moderately eroded	188	. 1
Fauquier channery loam, 0 to 5 percent slopes	244	. 1
Fauquier channery loam, 5 to 10 percent slopes, moderately eroded	1, 735	. 6
Fauquier channery loam, 10 to 20 percent slopes, moderately eroded	1, 144	. 4
Fauquier channery loam, 20 to 35 percent slopes, moderately eroded	271	. 1
Fauquier silt loam, 0 to 3 percent slopes	41	(1)
Fauquier silt loam, 3 to 10 percent slopes, moderately eroded	289	. 1
Fauquier silt loam, 10 to 20 percent slopes, moderately eroded	93	(1)
Fauquier silt loam, shallow, 3 to 20 percent slopes, moderately eroded	42	(1)
Fauquier very stony loam, 5 to 35 percent slopes	435	. 1
Frankstown extremely rocky silt loam, 0 to 25 percent slopes	983	. 3
Frankstown extremely rocky silt loam, 25 to 45 percent slopes	140	(1)
Frankstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded	2, 413	. 8

See footnote at end of table.

TABLE 4.—*Approximate acreage and proportionate extent of soils*—Continued

Soil	Area	Extent
	Acres	*Percent*
Frankstown very rocky silt loam, 8 to 15 percent slopes, severely eroded	586	0. 2
Frankstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded	519	. 2
Frankstown and Duffield channery silt loams, 0 to 3 percent slopes	244	. 1
Frankstown and Duffield channery silt loams, 3 to 8 percent slopes, moderately eroded	6, 909	2. 3
Frankstown and Duffield channery silt loams, 0 to 8 percent slopes, severely eroded	60	(1)
Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, moderately eroded	3, 111	1. 1
Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, severely eroded	1, 366	. 5
Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, moderately eroded	542	. 2
Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, severely eroded	864	. 3
Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, moderately eroded	162	. 1
Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, severely eroded	89	(1)
Frederick cherty silt loam, 0 to 8 percent slopes, moderately eroded	711	. 2
Frederick cherty silt loam, 8 to 15 percent slopes, moderately eroded	672	. 2
Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded	63	(1)
Frederick cherty silt loam, 15 to 25 percent slopes, moderately eroded	517	. 2
Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded	57	(1)
Frederick cherty silt loam, 25 to 45 percent slopes, moderately eroded	465	. 2
Hagerstown clay loam, 0 to 3 percent slopes	117	(1)
Hagerstown clay loam, 0 to 8 percent slopes, moderately eroded	775	. 3
Hagerstown clay loam, 3 to 8 percent slopes, severely eroded	52	(1)
Hagerstown clay loam, 8 to 15 percent slopes, moderately eroded	144	(1)
Hagerstown clay loam, 8 to 15 percent slopes, severely eroded	153	. 1
Hagerstown clay loam, 15 to 25 percent slopes, moderately eroded	123	(1)
Hagerstown clay loam, 15 to 25 percent slopes, severely eroded	190	. 1
Hagerstown extremely rocky silt loam, 0 to 25 percent slopes, moderately eroded	6, 696	2. 3
Hagerstown extremely rocky silty clay loam, 0 to 25 percent slopes, moderately eroded	4, 156	1. 4
Hagerstown extremely rocky soils, 25 to 45 percent slopes	111	(1)
Hagerstown silt loam, 0 to 3 percent slopes	1, 146	. 4
Hagerstown silt loam, 0 to 8 percent slopes, moderately eroded	22, 661	7. 7
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded	3, 690	1. 2
Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded	252	. 1
Hagerstown silty clay loam, 0 to 3 percent slopes	437	. 1
Hagerstown silty clay loam, 0 to 8 percent slopes, moderately eroded	4, 038	1. 4
Hagerstown silty clay loam, 8 to 15 percent slopes, moderately eroded	1, 458	. 5
Hagerstown silty clay loam, 15 to 25 percent slopes, moderately eroded	153	0. 1
Hagerstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded	10, 613	3. 6
Hagerstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded	1, 087	. 4
Hagerstown very rocky silty clay loam, 3 to 15 percent slopes, moderately eroded	8, 371	2. 8
Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded	2, 836	1. 0
Hagerstown very rocky silty clay loam, 15 to 45 percent slopes, moderately eroded	621	. 2
Hagerstown very rocky soils, 45 to 55 percent slopes	107	(1)
Hagerstown, Corydon, and Duffield very rocky silt loams, 0 to 3 percent slopes	424	. 1
Hagerstown and Duffield silt loams, 25 to 45 percent slopes, moderately eroded	149	. 1
Hazel channery silt loam, 0 to 10 percent slopes, moderately eroded	1, 438	. 5
Hazel channery silt loam, 10 to 20 percent slopes, moderately eroded	1, 856	. 6
Hazel channery silt loam, 10 to 20 percent slopes, severely eroded	202	. 1
Hazel channery silt loam, 20 to 30 percent slopes, moderately eroded	1, 095	. 4
Hazel channery silt loam, 20 to 30 percent slopes, severely eroded	124	(1)
Hazel channery silt loam, 30 to 45 percent slopes	210	. 1
Highfield gravelly loam, 0 to 5 percent slopes	67	(1)
Highfield gravelly loam, 5 to 10 percent slopes, moderately eroded	315	. 1
Highfield gravelly loam, 10 to 20 percent slopes, moderately eroded	212	. 1
Highfield gravelly loam, 20 to 35 percent slopes, moderately eroded	78	(1)
Highfield very stony loam, 0 to 5 percent slopes	44	(1)
Highfield very stony loam, 5 to 30 percent slopes	2, 123	. 7
Highfield very stony loam, 30 to 45 percent slopes	470	. 2
Holston gravelly loam, 0 to 3 percent slopes	439	. 1
Holston gravelly loam, 0 to 8 percent slopes, moderately eroded	1, 395	. 5
Holston gravelly loam, 8 to 15 percent slopes, moderately eroded	588	. 2
Holston gravelly loam, 8 to 25 percent slopes, severely eroded	49	(1)
Holston gravelly loam, 15 to 25 percent slopes, moderately eroded	118	(1)
Holston gravelly loam, 25 to 45 percent slopes, moderately eroded	70	(1)
Holston gravelly sandy loam, 3 to 8 percent slopes	115	(1)
Holston gravelly sandy loam, 3 to 15 percent slopes, moderately eroded	153	. 1
Holston gravelly sandy loam, 8 to 15 percent slopes, severely eroded	50	(1)
Holston silt loam, 0 to 3 percent slopes	224	. 1
Holston silt loam, 3 to 8 percent slopes, moderately eroded	666	. 2
Holston silt loam, 8 to 15 percent slopes, moderately eroded	208	. 1
Huntington fine sandy loam	1, 507	. 5
Huntington gravelly loam	671	. 2
Huntington silt loam	1, 439	. 5
Huntington silt loam, local alluvium	4, 811	1. 6
Laidig gravelly loam, 0 to 3 percent slopes	110	(1)
Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded	1, 278	. 4

See footnote at end of table.

TABLE 4.—*Approximate acreage and proportionate extent of soils*—Continued

Soil	Area	Extent
	Acres	*Percent*
Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded	1, 574	0. 5
Laidig gravelly loam, 15 to 25 percent slopes, moderately eroded	479	. 2
Laidig very stony loam, 8 to 25 percent slopes	722	. 2
Laidig very stony loam, 15 to 45 percent slopes, moderately eroded	110	(1)
Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded	65	(1)
Landisburg cherty silt loam, 8 to 25 percent slopes, moderately eroded	143	(1)
Largent silt loam	157	. 1
Leadvale gravelly silt loam, 0 to 3 percent slopes	49	(1)
Leadvale gravelly silt loam, 3 to 8 percent slopes, moderately eroded	475	. 2
Lindside silt loam	2, 435	. 8
Lindside silt loam, local alluvium	488	. 2
Litz channery loam, 3 to 10 percent slopes, moderately eroded	232	. 1
Litz channery loam, 10 to 20 percent slopes, moderately eroded	97	(1)
Litz channery loam, 10 to 20 percent slopes, severely eroded	109	(1)
Litz shaly loam, 0 to 10 percent slopes	366	. 1
Litz shaly loam, 3 to 10 percent slopes, moderately eroded	632	. 2
Litz shaly loam, 10 to 20 percent slopes, moderately eroded	1, 493	. 5
Litz shaly loam, 10 to 20 percent slopes, severely eroded	604	. 2
Litz shaly loam, 20 to 30 percent slopes, moderately eroded	791	. 3
Litz shaly loam, 20 to 30 percent slopes, severely eroded	579	. 2
Litz shaly loam, 30 to 45 percent slopes, moderately eroded	379	. 1
Litz shaly loam, 30 to 45 percent slopes, severely eroded	136	(1)
Litz shaly loam, 45 to 60 percent slopes	102	(1)
Litz-Teas channery silt loams, 0 to 8 percent slopes	193	. 1
Litz-Teas channery silt loams, 3 to 15 percent slopes, moderately eroded	625	. 2
Litz-Teas channery silt loams, 8 to 15 percent slopes, severely eroded	126	(1)
Litz-Teas channery silt loams, 15 to 25 percent slopes, moderately eroded	164	. 1
Litz-Teas channery silt loams, 15 to 25 percent slopes, severely eroded	167	. 1
Litz-Teas channery silt loams, 25 to 45 percent slopes, moderately eroded	56	(1)
Melvin silt loam	146	(1)
Monongahela gravelly loam, 3 to 8 percent slopes, moderately eroded	301	. 1
Monongahela gravelly loam, 8 to 15 percent slopes, moderately eroded	110	(1)
Monongahela silt loam, 0 to 3 percent slopes	443	. 1
Monongahela silt loam, 3 to 8 percent slopes, moderately eroded	861	. 3
Monongahela silt loam, 8 to 15 percent slopes, moderately eroded	223	. 1
Monongahela silt loam, 15 to 25 percent slopes, moderately eroded	57	(1)
Montevallo shaly loam, 0 to 10 percent slopes, moderately eroded	1, 857	. 6
Montevallo shaly loam, 10 to 20 percent slopes, moderately eroded	2, 972	1. 0
Montevallo shaly loam, 10 to 20 percent slopes, severely eroded	1, 628	. 6
Montevallo shaly loam, 20 to 30 percent slopes, moderately eroded	1, 812	. 6
Montevallo shaly loam, 20 to 30 percent slopes, severely eroded	623	0. 2
Murrill gravelly loam, 0 to 3 percent slopes	1, 479	. 5
Murrill gravelly loam, 0 to 8 percent slopes, moderately eroded	9, 485	3. 2
Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded	4, 122	1. 4
Murrill gravelly loam, 8 to 25 percent slopes, severely eroded	84	(1)
Murrill gravelly loam, 15 to 25 percent slopes, moderately eroded	596	. 2
Murrill gravelly loam, 25 to 45 percent slopes, moderately eroded	51	(1)
Murrill gravelly sandy loam, 0 to 8 percent slopes	368	. 1
Murrill gravelly sandy loam, 3 to 15 percent slopes, moderately eroded	678	. 2
Murrill gravelly sandy loam, 8 to 15 percent slopes, severely eroded	84	(1)
Murrill gravelly sandy loam, 15 to 25 percent slopes, moderately eroded	88	(1)
Murrill gravelly sandy loam, 15 to 25 percent slopes, severely eroded	46	(1)
Murrill silt loam, 0 to 3 percent slopes	269	. 1
Murrill silt loam, 0 to 8 percent slopes, moderately eroded	872	. 3
Murrill silt loam, 8 to 15 percent slopes, moderately eroded	214	. 1
Myersville channery loam, 0 to 3 percent slopes	47	(1)
Myersville channery loam, 3 to 10 percent slopes, moderately eroded	1, 331	. 5
Myersville channery loam, 10 to 20 percent slopes, moderately eroded	1, 676	. 6
Myersville channery loam, 20 to 30 percent slopes, moderately eroded	418	. 1
Myersville channery loam, 30 to 45 percent slopes, moderately eroded	175	. 1
Myersville channery silt loam, 3 to 10 percent slopes, severely eroded	52	(1)
Myersville channery silt loam, 10 to 30 percent slopes, severely eroded	57	(1)
Myersville silt loam, 0 to 3 percent slopes	131	(1)
Myersville silt loam, 3 to 10 percent slopes, moderately eroded	532	. 2
Myersville silt loam, 10 to 20 percent slopes, moderately eroded	153	. 1
Myersville very stony loam, 3 to 30 percent slopes, moderately eroded	1, 428	. 5
Myersville very stony loam, 30 to 55 percent slopes, eroded	147	(1)
Philo gravelly sandy loam	430	. 1
Philo silt loam	1, 254	. 4
Pope fine sandy loam	1, 793	. 6
Pope gravelly loam	436	. 1
Pope gravelly sandy loam	446	. 2
Pope silt loam	442	. 1
Pope stony gravelly loam	87	(1)
Rocky eroded land	823	. 3
Rohrersville silty clay loam, 0 to 8 percent slopes, moderately eroded	216	. 1
Stony rolling land	4, 643	1. 6
Stony steep land	2, 857	1. 0
Talladega gravelly silt loam, thick solum variant, 0 to 20 percent slopes, moderately eroded	794	. 3
Talladega gravelly silt loam, thick solum variant, 10 to 20 percent slopes, severely eroded	53	(1)
Talladega gravelly silt loam, thick solum variant, 20 to 30 percent slopes	160	. 1

See footnote at end of table.

TABLE 4.—*Approximate acreage and proportionate extent of soils*—Continued

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Talladega gravelly silt loam, thick solum variant, 20 to 45 percent slopes, moderately eroded	111	(1)	Waynesboro gravelly loam, 15 to 25 percent slopes, severely eroded	322	0. 1
Terrace escarpments	341	0. 1	Waynesboro gravelly loam, 25 to 45 percent slopes, moderately eroded	98	(1)
Thurmont gravelly loam, 3 to 8 percent slopes, moderately eroded	460	. 2	Waynesboro gravelly sandy loam, 0 to 8 percent slopes	125	(1)
Thurmont gravelly loam, 8 to 15 percent slopes, moderately eroded	245	. 1	Waynesboro gravelly sandy loam, 3 to 15 percent slopes, moderately eroded	628	. 2
Trego gravelly silt loam, 0 to 3 percent slopes	89	(1)	Waynesboro gravelly sandy loam, 8 to 15 percent slopes, severely eroded	103	(1)
Trego gravelly silt loam, 3 to 15 percent slopes, moderately eroded	252	. 1	Waynesboro gravelly sandy loam, 15 to 25 percent slopes, moderately eroded	137	(1)
Tyler silt loam, 0 to 8 percent slopes	127	(1)	Wehadkee silt loam	183	. 1
Warners loam, 0 to 8 percent slopes	1, 646	. 6	Westmoreland channery silt loam, 3 to 10 percent slopes, moderately eroded	311	. 1
Waynesboro gravelly loam, 0 to 3 percent slopes	166	. 1	Westmoreland channery silt loam, 10 to 20 percent slopes, moderately eroded	263	. 1
Waynesboro gravelly loam, 0 to 8 percent slopes, moderately eroded	2, 387	. 8	Westmoreland channery silt loam, 3 to 20 percent slopes, severely eroded	278	. 1
Waynesboro gravelly loam, 8 to 15 percent slopes, moderately eroded	1, 490	. 5	Westmoreland channery silt loam, 20 to 30 percent slopes, moderately eroded	82	(1)
Waynesboro gravelly loam, 3 to 15 percent slopes, severely eroded	475	. 2	Westmoreland channery silt loam, 20 to 30 percent slopes, severely eroded	100	(1)
Waynesboro gravelly loam, 15 to 25 percent slopes, moderately eroded	236	. 1	Total	295, 680	98. 8

[1] Less than 0.1 percent.

Ashton Series

The Ashton series consists of deep, well-drained, weakly developed soils on low terraces or second bottoms along the Potomac River. These soils developed in old alluvium that washed from soils underlain by limestone or from materials strongly influenced by limestone. The higher terraces in the same general areas are occupied by soils developed in more acid materials, such as the soils of the Holston, Monongahela, and Waynesboro series.

The Ashton soils are very productive under good management. They are limited in extent and occupy less than 100 acres.

Profile of Ashton fine sandy loam, 0 to 5 percent slopes, in a temporarily idle area where Orchard Road reaches the Potomac River, in the Cohill community:

A_p 0 to 9 inches: dark-brown (10YR 3/3) fine sandy loam; weak, fine, crumb structure; slightly hard when dry, very friable when moist, and nonplastic and nonsticky when wet; roots abundant; neutral; clear, wavy boundary; horizon is 6 to 12 inches thick.

B_1 9 to 16 inches: dark-brown (10YR 4/3), heavy fine sandy loam; weak, fine to medium, crumb to weak, very fine, subangular blocky structure; slightly hard when dry, very friable when moist, and slightly plastic but nonsticky when wet; roots plentiful; many fine and medium pores; slightly acid to neutral; gradual, wavy boundary; horizon is 5 to 8 inches thick.

B_2 16 to 45 inches: yellowish-brown (10YR 5/4), heavy loam to light silt loam; weak, medium, subangular blocky structure; moderately hard when dry, friable when moist, and plastic and slightly sticky when wet; roots fairly plentiful in upper portion to practically none in lower portion; many fine and medium pores and a few worm channels; slightly acid to neutral; clear, wavy to irregular boundary; horizon is 18 to 40 inches thick.

C 45 to 80 inches: yellowish-brown (10YR 5/4) fine sandy loam to silt loam; about 20 percent fine, distinct mottles of very dark grayish brown (10YR 3/2); very weak, very coarse, subangular blocky structure becoming somewhat coarse, platy in places; moderately hard when dry, firm when moist, and slightly plastic but nonsticky when wet; no roots; moderately permeable; contains 10 to 15 percent fine and very fine gravel; moderately alkaline; clear, irregular boundary; horizon is 24 to 40 inches thick.

D 80 to 108 inches +: stratified gravel, sand, silt, and clay loam; gravel makes up about 60 percent of the mass and is waterworn; fine materials are of same color as those in the C horizon, but with about 40 percent mottles; massive; hard when dry, firm to friable when moist, with finer materials plastic and slightly sticky when wet; no roots; moderately rapidly permeable; mildly to moderately alkaline.

All horizons are variable in thickness, particularly the B_2 horizon of the subsoil. The variations apparently are correlated with the topography. The soils that have the thickest, most strongly developed B horizons are in the highest positions. In soils in the lower positions, the B horizon is thinner and more poorly developed, but the surface layer may be 2 or more feet thick. In a few areas there are some shale and sandstone fragments in the substratum, but in most places the coarse material is chert.

The Ashton soils are well drained, but within the areas there may be some wet spots or shallow sinks. The surface is generally smooth, but there are a few hummocks in places. The low terraces on which the Ashton soils are located are generally at least 20 feet higher than the flood plains. These soils have moderate overall permeability and moderately high to high moisture-supplying capacity. They may be covered with water during general floods at intervals of several years.

Ashton fine sandy loam, 0 to 5 percent slopes (AsB).—This soil has the profile that has been described.

It is the only Ashton soil in the county. Since there are no great hazards, except flooding for short periods at intervals many years apart, this soil is suitable for almost all the crops grown in the region with only reasonably good, simple management practices. Although the soil occurs at comparatively low elevations, it has fairly good air drainage because of its position above the Potomac River. Most of the soil has been planted to orchards, but, at the time of this report, the orchards had not come into production. Time will tell whether the soil is well suited to orchards or not. This is one of the better soils of the county. It occupies only 78 acres and is in capability unit I–6.

Atkins Series

The Atkins series consists of poorly drained soils in recently deposited alluvium on the flood plains. The soils are generally along the smaller streams. The deposits are made up of outwash from acid shale and sandstone areas. On the same materials and along the same streams are the moderately well drained to somewhat poorly drained Philo soils and the well drained Pope soils.

The Atkins soils are not very extensive. Because they are too wet for many purposes, they are not of very great importance in agriculture.

Profile of Atkins silt loam, in a cutover forested area at a point just off McCoys Ferry Road, one-half mile south of its intersection with Greenspring Furnace Road:

A_1 0 to 6 inches: olive-brown (2.5Y 4/4) silt loam; moderate, medium, crumb structure; hard when dry, friable when moist, plastic and sticky when wet; roots abundant; medium to slightly acid; clear, smooth boundary; horizon is 4 to 8 inches thick.

C_{1g} 6 to 16 inches: dark grayish-brown or olive-gray (2.5Y 4/2 or 5Y 4/2) silty clay loam; about 30 percent fine and medium, distinct mottles of dark brown (7.5YR 4/4); compound, weak, coarse, platy and moderate, medium, blocky and subangular blocky structure; hard to very hard when dry, rather firm when moist, and plastic and sticky when wet; roots confined mostly to upper portion; slowly permeable; strongly acid; clear, smooth boundary; horizon is 8 to 16 inches thick.

C_{2g} 16 to 36 inches +: olive-brown (2.5Y 4/4) fine gravelly sandy clay loam; about 40 percent fine, medium and coarse, distinct mottles of dark gray, reddish brown, and strong brown; stratified with a very weak, coarse, platy structure; very hard when dry, firm when moist, and plastic and sticky when wet; practically no roots; slowly permeable; very strongly acid.

The greatest variation in the Atkins soils of Washington County is in thickness, or in depth to the gravelly C horizon. Overall permeability is slow, and, though these soils are very wet for long periods, they can become very hard and droughty during extended dry weather. Their moisture-supplying capacity is, therefore, rather low, even though they may be flooded nearly every year and sometimes for rather long periods. Because of their adverse moisture relationships, these soils are suited to cultivated crops only with drainage and water control, and then are used chiefly for corn, forage crops, or pasture.

Atkins silt loam (At).—This soil, which has the profile that has been described in detail, is the only Atkins soil in Washington County. Because of its wetness, it is placed in capability unit IIIw–1. There are 1,164 acres. Any areas damaged by frequent overflows should be maintained in permanent grass or woodland.

Benevola Series

The Benevola series consists of deep, very well drained, dark-red, fine-textured soils developed from rather soft, very fine grained, sandy limestone. The Benevola soils have very strong structure in the subsoil and an exceptionally high degree of porosity for such fine-textured soils. Locally, some small areas of these soils are moderately deep or shallow over ledges of the limestone, and there are occasional outcroppings of the sandy limestone.

The Benevola soils are on nearly level or gently rolling valley floors. They are mostly in the area from about Benevola northeastward nearly to Bagtown. Other soils on limestone are those of the Duffield, Frankstown, and Hagerstown series.

Although the Benevola soils are not extensive, they are excellent agricultural soils and have all been cleared for use.

Profile of Benevola clay loam, 0 to 3 percent slopes, in an old cultivated area about 60 yards south of U.S. Highway No. 40, almost directly across that highway from the Hagerstown drive-in theater, about halfway between Wagner's Crossroads and Mount Lena:

A_p 0 to 6 inches: dark reddish-brown (5YR 3/4) clay loam; strong, medium, granular to strong, very fine, blocky structure; moderately hard when dry, friable when moist; roots fairly abundant; highly porous; contains occasional fragments of fine-grained, very sandy limestone; neutral in reaction; clear, smooth boundary; horizon is 5 to 7 inches thick.

B_{21} 6 to 13 inches: dark reddish-brown (5YR 3/4) fine clay loam or clay; strong, fine to medium, blocky and subangular blocky structure; blocks crush when moist to strong, fine granules; hard when dry, friable to somewhat firm when moist, and plastic and sticky when wet; roots plentiful; abundant medium pores; slightly compacted at upper boundary (probably a plowsole); contains occasional fragments of sandy limestone; neutral; gradual, wavy boundary; horizon is 6 to 10 inches thick.

B_{22} 13 to 35 inches: dark-red (2.5YR 3/6) clay; very strong, very fine to fine, blocky and subangular blocky structure; blocks crush when moist to very strong, very fine granules; hard when dry, firm when moist, and plastic and sticky when wet; roots few to fairly plentiful in upper portion; abundant fine and medium pores; continuous self-colored clay skins on aggregates; clear to abrupt, irregular boundary; horizon is 18 to 30 inches or more thick.

C 35 to 42 inches +: yellowish-brown to light-gray (10YR 5/4 to 5Y 6/1) gravelly very fine sand or loamy very fine sand; single-grain structure; soft to loose when dry, soft when moist, and nonplastic and nonsticky when wet; occasional roots; rapidly to very rapidly permeable; gravel consists of fragments of very fine grained sandy limestone in all stages of decomposition; mildly to moderately alkaline to calcareous.

Some areas are included that are less intensely red than the profile described. The greatest variation in the soils, however, is in depth to bedrock. In some places the soil is very deep but is only a few feet away from an outcrop of the limestone. The surface soil described probably includes some subsoil that has been incorporated into the surface layer as the result of repeated plowing. In spite of their fine texture, the overall permeability of the Benevola soils is rapid because of the good struc-

ture. Where the soil is of normal thickness over rock, the moisture-supplying capacity is very high.

Benevola clay loam, 0 to 3 percent slopes (BaA).—On this nearly level or gently sloping soil, there has been little, if any, erosion. This soil has the profile described. All of this soil is in use for crops or pastures, except for occasional homesites. Although it is not particularly subject to deterioration, this soil is difficult to manage, except within a very narrow range of moisture content, because of its fine texture and its stickiness and plasticity. For this reason, this soil is in capability unit IIs–1. There are 159 acres.

Benevola clay loam, 3 to 8 percent slopes, moderately eroded (BaB2).—This soil is sloping and has been somewhat eroded. It can be used for all the crops commonly grown, with proper erosion control and other management practices, without serious further damage. However, it is difficult to handle. This soil is in capability unit IIe–19. There are 412 acres.

Benevola clay loam, 8 to 15 percent slopes, moderately eroded (BaC2).—Because of the hazard of erosion and the general difficulty of management, this soil is in capability unit IIIe–30. There are 176 acres.

Benevola clay loam, 8 to 15 percent slopes, severely eroded (BaC3).—On this soil, erosion has been active and damaging. Because of the combination of fairly strong slopes and severe erosion, the 65 acres of this soil are in capability unit IVe–1. This soil can be cultivated in long rotations with hay or pasture most of the time, if other good management is practiced.

Berks Series

The Berks series consists of well-drained to somewhat excessively drained, rather shallow soils that developed primarily from acid shales. The soils occupy rolling valley floors and rather steep ridges. They are extensive in Washington County in the areas that border Conococheague Creek and in the ridge and valley section west of Fairview Mountain. In some places the shale underlying the Berks soils is somewhat influenced by limestone.

The Berks soils are somewhat similar to the Montevallo soils in appearance, but the underlying shale is softer and more readily incorporated into the soil by plowing and cultivation than the shale under the Montevallo soils, and it is more permeable to water and to roots. The Berks are also more productive than the shallower Montevallo soils.

Profile of Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated area on Independence Road, 1¼ miles northeast of Conococheague Bridge:

A_p 0 to 8 inches: dark-brown (10YR 4/3) shaly silt loam; moderate, medium, crumb structure; friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; strongly acid; clear, smooth boundary; horizon is 6 to 9 inches thick.

B_2 8 to 13 inches: yellowish-brown (10YR 5/4), shaly, heavy silt loam; weak, fine to medium, subangular blocky structure; friable when moist, and moderately plastic and slightly sticky when wet; roots fairly common; abundant pores; thin, almost continuous, self-colored clay skins; 30 to 40 percent shale; very strongly acid; clear, wavy boundary; horizon is 3 to 6 inches thick.

C 13 to 24 inches: dark yellowish-brown (10YR 4/4), fragmented, soft shale, strongly coated with silt and clay; very few roots; rapidly permeable; fine material very strongly acid; gradual, wavy to irregular boundary; horizon is 8 to 24 inches thick.

D_r 24 inches +: moderately hard, yellowish-brown or brownish-yellow shale.

There is considerable variation in the amount of shale fragments in the profile. Some undisturbed areas have very little shale in the surface soil. There is considerable shale in the surface layer of practically all plowed areas, however, because plowing to normal depth almost invariably incorporates some of the more shaly B_2 horizon into the plow layer.

In some places the subsoil has a slightly reddish cast, approaching reddish brown (5YR 5/4) in color. In places there are thin seams of sandstone in the parent shale, particularly in the western part of the county. In such places the soil tends to be a little less silty than the soil described above, and may contain few to many flat fragments of sandstone.

Berks channery loam, ridges, 0 to 10 percent slopes, moderately eroded (BcB2).—Most of this soil is on ridgetops. It has a profile like the one described, but it is somewhat less silty and more sandy and contains 20 percent or more of flat fragments of hard sandstone up to 6 inches in length. The soil contains considerable shale. The sandstone fragments may be present throughout the profile but are generally more abundant on and near the surface. On the gentle slopes the low moisture capacity, hence low production, of the soil is a more important management problem than erosion. The 815 acres are in capability unit IIs–7.

Berks channery loam, ridges, 10 to 20 percent slopes, moderately eroded (BcC2).—The slope of this soil is great enough to make risk of erosion the number one management problem if good cover is not maintained. The soil is also droughty and of rather low productivity, but it can be cultivated safely with careful management. This soil is perhaps better suited to hay crops and to sodded orchards than to clean-cultivated crops. The 879 acres are in capability unit IIIe–32.

Berks channery loam, ridges, 10 to 20 percent slopes, severely eroded (BcC3).—This soil has been seriously damaged by erosion. The original surface soil is nearly all gone, and there may be occasional shallow gullies. In this condition the soil is suited to only occasional cultivation of crops in long rotations with hay or pasture plants, or to sodded orchards. There are 194 acres, in capability unit IVe–32.

Berks channery loam, ridges, 20 to 30 percent slopes, moderately eroded (BcD2).—This soil is steeper than the one just described, but erosion has been less severe, largely because much of the soil has remained in forest. There is a strong hazard of erosion because of steepness, so this soil has also been placed in capability unit IVe–32. There are 632 acres in this county.

Berks shaly silt loam, 0 to 8 percent slopes (BeB).—This soil has a profile like the one described for the series, except that there has been practically no erosion. It has either been in woodland or has been especially well managed. Because erosion has not been serious, the shallowness of the soil and its low moisture-holding capa-

city are the most important management factors. There are 1,002 acres of this soil, in capability unit IIIs–2.

Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded (BeB2).—This soil has the profile that has been described in detail. Erosion has been active, even though slopes are not very great. Because most of this soil is in cultivation, the erosion hazard is the most significant management problem. The soil also is thin and somewhat droughty. The 2,606 acres of this soil are in capability unit IIIs–2.

Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded (BeC2).—On this soil, erosion has been active, although not severe. The soil is suitable for regular cultivation if careful erosion control is practiced. Measures to maintain fertility and moisture are also very important. The 2,381 acres of this soil are in capability unit IVe–32.

Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded (BeD2).—There is such a great erosion hazard that this soil must be very carefully managed and protected if it is to be cultivated. Very long rotations with few clean-tilled crops will be necessary if this soil is to be preserved. It occupies 352 acres and is in capability unit VIe–3.

Berks silt loam, ridges, 0 to 10 percent slopes, moderately eroded (BkB2).—This soil has a profile much like the one described for the Berks series, except that the surface soil contains fewer fragments of shale. It is confined chiefly to the ridge areas in the western part of the county. This soil is in capability unit IIs–7. There are 695 acres in the county.

Berks silt loam, ridges, 10 to 20 percent slopes, moderately eroded (BkC2).—Erosion on this soil has been only moderate, but there is definitely a strong hazard of erosion. For this reason, the 391 acres are placed in capability unit IIIe–32.

Berks silt loam, ridges, 10 to 20 percent slopes, severely eroded (BkC3).—This soil has lost most of its original surface soil and in places some of the original subsoil. It is less suitable for cultivation and requires much more careful management than the similar, but only moderately eroded, soil. This soil occupies 304 acres and is in capability unit IVe–32.

Berks silt loam, ridges, 20 to 30 percent slopes, moderately eroded (BkD2).—This soil is steep, but it has been forested and erosion has not been severe. It can be cropped with very careful management. The 273 acres are in capability unit IVe–32.

Berks soils, ridges, 20 to 45 percent slopes, severely eroded (BoE3).—The soils of this unit are steep and are so severely eroded that few characteristics of the Berks series remain. The original surface soil and some of the subsoil have been eroded away, and the remaining soil over the shale rock is only a thin, irregular mantle. Such soils are not suitable for crops. Under the best management, they may produce some grazing, but their most suitable use is probably as reforested woodland. There are 823 acres, in capability unit VIIe–3.

Berks soils, ridges, 30 to 60 percent slopes (BoF).—These are small, very steep areas of various Berks soils —either the silt loam, the channery loam, or the shaly silt loam. For the most part, they have remained in forest and have not been significantly damaged by erosion. The 3,987 acres are in capability unit VIIe–3.

Braddock Series

The Braddock series consists of deep, well-drained, red soils developed in materials that weathered from very old rockslides on the foot slopes of mountains and on benchlike areas on mountainsides. The Braddock soils are gravelly, and in a few places they are somewhat stony. The materials from which they have been developed consist largely of quartzitic sandstone, but in many places there is some greenstone or metabasalt and some hard, white quartzite. In local spots there is also some shale.

The Braddock soils in Washington County occur on and below the western slopes of Blue Ridge and Elk Ridge. They are associated with, and in many places are mixed with, soils of the Thurmont series that are more yellow than red. Because of this association and mixture, all of the Braddock soils of the county have been mapped in undifferentiated mapping units with Thurmont soils.

Most areas are in forest, but some are cultivated. The soils are especially suited to orchards, but they can also be used for general crops and pastures. They are fairly productive, but their content of gravel makes them somewhat difficult to handle.

Profile of Braddock gravelly loam, 3 to 8 percent slopes, moderately eroded, in a forested area just east of Mount Lena Road, about 120 yards northeast of its intersection with Ruble Road:

A_1 0 to 4 inches: dark-brown (7.5YR 3/2) gravelly loam; moderate, fine, granular structure; slightly hard when dry, very friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; about 20 percent gravel; slightly acid; clear, wavy boundary; horizon is 2 to 4 inches thick.

A_2 4 to 11 inches: dark-brown (10YR 3/3), gravelly, heavy loam; moderate, fine, crumb to granular structure; moderately hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots plentiful; many fine and medium and a few large pores; about 20 percent gravel; medium acid; clear, wavy boundary; horizon is 4 to 8 inches thick.

B_1 11 to 22 inches: strong-brown (7.5YR 5/6), gravelly, heavy loam; weak, medium, subangular blocky structure; moderately hard to hard when dry, friable to moderately firm when moist, and moderately plastic and sticky when wet; roots plentiful in upper portion, fewer below; many fine and medium pores; 20 to 25 percent gravel; strongly acid; gradual, wavy boundary; horizon is 8 to 14 inches thick.

B_2 22 to 38 inches: yellowish-red (5YR 4/8), gravelly, light sandy clay loam; moderate, medium, blocky and subangular blocky structure; hard to very hard when dry, firm when moist, plastic and sticky when wet; roots few; many fine and medium pores; about 20 percent gravel; thin, continuous, self-colored clay coats on aggregates and in pores and root channels; very strongly acid; gradual, smooth to wavy boundary; horizon is 14 to 28 inches thick.

B_3 38 to 46 inches: yellowish-red (5YR 5/8), gravelly, very gritty sandy clay loam; moderate, medium, blocky structure; hard when dry, friable to firm when moist, plastic and sticky when wet; roots few; many fine and medium pores; about 20 percent gravel; thick, red clay skins in pores and in root channels and on some aggregate surfaces, with black films on other surfaces; extremely acid; gradual, wavy boundary; horizon is 8 to 12 inches thick.

C 46 to 60 inches +: yellowish-red (5YR 5/6) gravelly sandy clay, somewhat variegated with faint reddish-yellow spots and streaks; very weak, coarse, blocky structure; hard to very hard when dry, friable to firm when moist, and plastic and moderately sticky when wet; a few large tree roots; many fine and medium pores; about 40 percent gravel; some black films on aggregates and on gravel; extremely acid.

The Braddock soils vary somewhat in content of gravel and in color. Some areas are somewhat cobbly, particularly those along drainageways. The Braddock soils may be even more red than the representative profile described. More frequently the variation is toward the yellow side, where the soil grades to soils of the Thurmont series. These soils in many places have a sort of landslide topography with complex or broken slopes.

Braddock and Thurmont gravelly loams, 3 to 8 percent slopes, moderately eroded (BrB2).—This unit includes the Braddock soil that has been described in detail, along with some areas of Thurmont gravelly loam with similar slope and erosion. It occupies the least sloping areas; there are practically no really level areas. There has been some erosion on most of the soil, but some small areas are included where there has been no erosion. Fairly good crops, especially orchard crops, can be grown with reasonably good management. Because of the hazard of erosion, however, the 575 acres of this unit are in capability unit IIe–4.

Braddock and Thurmont gravelly loams, 8 to 15 percent slopes, moderately eroded (BrC2).—Because of the degree of slope, good management must be practiced if this soil is to be cultivated safely. Nearly all crops can be grown if they are in suitable rotations. The soil is especially suited to orchards and berry plantings. The 567 acres are in capability unit IIIe–4.

Braddock and Thurmont gravelly loams, 15 to 25 percent slopes (BrD).—These are the steepest Braddock and Thurmont soils. There has been active erosion on only a few acres. The rest of the acreage was in forest, which protected the soil against erosion. These areas could be cultivated with very careful management. This soil occupies only 74 acres. It is in capability unit IVe–3.

Brinkerton Series

The Brinkerton series consists of poorly drained soils in areas of acid shale, particularly within large areas of soils of the Berks and Montevallo series. The Brinkerton soils occur in upland depressions around drainage heads, and along narrow foot slopes bordering small drains. They were developed in fine materials that were washed down from the surrounding areas of shale soils. The Brinkerton soils have an extremely fine textured and strongly mottled, bluish or greenish subsoil, which is an indication of poor aeration and drainage. They occur only in small, scattered areas.

Profile of Brinkerton silt loam, 0 to 8 percent slopes, in a pastured area just off Walnut Point Road, about one-fourth mile south of Jones Chapel:

A_p 0 to 7 inches: dark-brown to olive-brown (10YR 3/3 to 2.5Y 4/4) silt loam; moderate, medium to coarse, crumb structure; hard to very hard when dry, friable when moist, and moderately plastic and moderately sticky when wet; roots plentiful; medium acid; clear to abrupt, smooth to slightly wavy boundary; horizon is 5 to 7 inches thick.

B_{21g} 7 to 15 inches: light olive-brown (2.5Y 5/4) shaly silty clay loam; about 30 percent medium, distinct mottles of light olive gray (5Y 6/2); strong, medium, blocky structure; very hard when dry, firm to very firm when moist, and plastic and sticky when wet; roots rather few; many fine but few larger pores; slightly acid; gradual, wavy to irregular boundary; horizon is 6 to 9 inches thick.

B_{22tg} 15 to 31 inches: clay, evenly mottled with coarse, distinct splotches of gray and olive brown (5Y 6/1 and 2.5Y 5/6); very strong, coarse, blocky structure; very hard when dry, very firm when moist, and very plastic and very sticky when wet; a very few fine roots; only a few very fine, visible pores; medium acid; abrupt, irregular boundary; horizon is 10 to 18 inches thick.

C_{tg} 31 to 42 inches +: greenish-blue to robin's-egg blue very fine clay; about 5 percent small specks and narrow streaks of rusty brown; compound, weak, very coarse, platy and weak, medium, blocky structure; very hard when dry, very firm when moist, and very plastic and very sticky when wet; a few scattered, single, fine roots; very slowly permeable, with no visible pores except for the widely spaced fine root channels; blue color almost completely fades to light gray on drying; neutral.

Most areas are more acid than the one described, which was undoubtedly limed. Bluish or greenish colors always appear in the substratum but may not be so strong as in the profile described, and the subsoil may not everywhere be so fine. Although drainage is poor and the soil may be wet for long periods, the moisture-supplying capacity of this soil is rather low. In many locations there is temporary flooding during periods of very heavy or prolonged rains.

Brinkerton silt loam, 0 to 8 percent slopes (BtB).—This is the only Brinkerton soil mapped in the county. This soil has the profile that has been described in detail. Although some slopes are as steep as 8 percent, most of this soil is nearly level to slightly depressed. Erosion is generally not a problem, but a few strongly sloping spots have some rills or a few shallow gullies. The greatest problem in managing this soil is that of drainage and wetness. For this reason, the 236 acres of this soil are in capability unit IIIw–1.

Buchanan Series

The Buchanan series consists of moderately well drained soils that have a platy fragipan in the lower subsoil. These soils were developed in gravelly colluvial deposits on the lower slopes of low mountains. The parent material consists of fine-grained, acid sandstone and, in a few places, some acid shale. Seeps and wet-weather springs are fairly common.

These soils are rather low in productivity and are little used in the county except for forests. Cleared areas can be used for general crops, but there are many idle areas. Little acreage is used for orchards or pastures. The Buchanan soils are not extensive in the county, occurring mostly in small, widely scattered areas that amount to less than 1,600 acres. Of this, approximately 600 acres have been cleared, and the rest remains in forest.

Profile of Buchanan gravelly loam, 0 to 3 percent slopes, in a forested area just east of Long Ridge Road, two-tenths of a mile south of its intersection with U.S.

Highway No. 40, on the lower western slope of Tonoloway Ridge:

A_1 0 to 2 inches: black (10YR 2/1), highly organic gravelly loam; weak, fine, crumb structure; soft to very slightly hard when dry, very friable when moist, and very slightly plastic but nonsticky when wet; matted with fine roots; gravel consists chiefly of angular sandstone; strongly acid; clear to abrupt, wavy boundary; horizon is 1 to 2 inches thick.

A_2 2 to 7 inches: yellowish-brown (10YR 5/4), gravelly, heavy loam; moderate, coarse, crumb structure; moderately hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots plentiful; abundant fine and medium pores; very strongly acid; abrupt, wavy boundary; horizon is 3 to 8 inches thick.

B_{21} 7 to 18 inches: brownish-yellow (10YR 6/6), somewhat gravelly silty clay loam; strong, fine, subangular blocky structure; hard when dry, moderately firm when moist, and plastic and sticky when wet; roots rather few; many fine and some medium pores; very strongly acid; clear, wavy boundary; horizon is 3 to 12 inches thick.

B_{22m} 18 to 34 inches: light yellowish-brown (2.5Y 6/4) clay loam; about 40 percent medium, distinct mottles of reddish yellow (7.5YR 6/6); compound, moderate, medium, platy and strong, fine, subangular blocky structure; very hard when dry, firm but brittle when moist, and plastic and sticky when wet; no visible roots; many fine but few large pores; very strongly acid; clear, wavy boundary; horizon is 12 to 20 inches thick.

C 34 to 60 inches +: disintegrated sandstone and shale with some silt and clay of intricately mixed, dark yellowish-brown and black colors; very weak, coarse, platy structure; moderately hard when dry, firm when moist, and slightly plastic and slightly sticky when wet; no roots; very strongly acid.

Nearly all areas of Buchanan soils are gravelly, but in places the gravel content is low. There is generally more gravel in the surface layer than in the subsoil. The map indicates some stones in places and also some small spots that are wetter than normal. In places the upper subsoil is thin or almost lacking, and in these areas the mottled, platy lower subsoil is generally within about 10 inches of the surface.

Buchanan gravelly loam, 0 to 3 percent slopes (BuA).—This soil has the profile that has been described, and includes the best areas of Buchanan soils in the county. Slopes are not strong and erosion is not a great hazard, but the soil tends to be rather wet on these more level areas. The 77 acres of this soil are in capability unit IIw–1, and most of the acreage is cultivated.

Buchanan gravelly loam, 3 to 8 percent slopes, moderately eroded (BuB2).—On this soil, erosion has been rather active. The slopes drain better than the more level areas, so erosion is a greater hazard than wetness. The 866 acres are in capability unit IIe–13.

Buchanan gravelly loam, 8 to 15 percent slopes, moderately eroded (BuC2).—Erosion is a serious hazard on this soil. Crops can be grown with suitable rotations and careful management. There are 562 acres, in capability unit IIIe–13.

Buchanan gravelly loam, 15 to 25 percent slopes, moderately eroded (BuD2).—This is the steepest Buchanan soil. In most places the soil is still forested. In the few spots that have been cleared, cultivation is hazardous unless special protective measures are taken. The 86 acres are in capability unit IVe–9.

Calvin Series

The Calvin series consists of shallow to moderately deep, very well drained soils developed in materials that weathered from acid, red shale, with some inclusions of acid, red sandstone. The Calvin soils are in the western part of the county, generally along with soils of the Berks, Litz, and Montevallo series.

The Calvin soils in some places have well-defined boundaries, but in many places they are so intricately mixed with soils of the Berks or Montevallo series that they cannot be separated on the soil map. Such areas of mixed soils are known as soil complexes.

Most areas of Calvin soils are still in forest, but some have been cleared for general crops, orchards, or pastures.

Profile of Calvin channery loam, 10 to 20 percent slopes, moderately eroded, in a forest 50 yards west of Rice Road, about six-tenths of a mile south of the Pennsylvania State line:

A_1 0 to 1 inch: very dark brown (10YR 2/2) channery loam; weak to moderate, fine, granular structure; soft when dry, very friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; contains about 15 percent flat fragments of hard sandstone and some shale; medium acid; abrupt, irregular boundary; horizon is ½ inch to 2 inches thick.

A_2 1 to 3 inches: reddish-brown (5YR 4/4) channery loam; weak, medium, granular to crumb structure; slightly hard when dry, friable when moist, and moderately plastic and moderately sticky when wet; roots plentiful; about 30 percent sandstone, with some shale; strongly acid; gradual, irregular boundary; horizon is 2 to 4 inches thick.

A_3 3 to 9 inches: reddish-brown (2.5YR 5/4) very channery loam; moderate, fine, subangular blocky structure; hard when dry, friable to firm when moist, and moderately plastic and moderately sticky when wet; roots rather plentiful; contains 40 to 50 percent flat, stone fragments; very strongly acid; gradual to clear, irregular boundary; horizon is 5 to 8 inches thick.

B_2 9 to 21 inches: red (2.5YR 5/6), channery, heavy loam or light silt loam; moderate, medium to coarse, blocky and subangular blocky structure; very hard when dry, firm when moist, and plastic and sticky when wet; few roots; many fine and medium pores; some clay skins in pores and on aggregates; very strongly acid; clear, wavy boundary; horizon is 8 to 12 inches thick.

C_1 21 to 31 inches: variegated yellowish-red and reddish-yellow (5YR 4/6 and 6/8) channery silt loam and decomposed shale; inherited, coarse, laminar structure; hard when dry, firm when moist, and plastic and sticky when wet; practically no roots; very strongly acid; gradual, wavy to irregular boundary; horizon is 8 to 12 inches thick.

C_2 31 to 42 inches +: reddish-yellow (5YR 6/6), partially decomposed shale with some hard sandstone; about 10 percent fine, illuvial material; fine material sticky and plastic when wet; no roots; very strongly acid.

The depth to the substratum ranges from about 12 to nearly 30 inches, with the average 18 to 20 inches. In some places the surface layer is slightly more sandy than that in the profile described. Slopes are complex in some places, but they are smooth and simple in most areas. The Calvin soils are so well drained that they may be droughty in periods of limited rainfall.

Calvin channery fine sandy loam, 3 to 10 percent slopes, moderately eroded (CaB2).—This soil has a profile like the one described as representative of the Calvin series, except that the channery surface soil is fine sandy loam and the subsoil is somewhat more friable than the one described. Because of the sandiness, the soil tends

to be somewhat droughty, but the hazard of erosion is probably the most important management problem. Nearly all of this soil occurs in the vicinity of Exline in the extreme western part of the county. It is used for all crops, but appears to be especially desirable for peach and apple orchards. The 276 acres are in capability unit IIe–10.

Calvin channery loam, 3 to 10 percent slopes, moderately eroded (CcB2).—This soil has a profile like the one described. Areas of it make up most of the cultivated Calvin channery loams. Much of it is in forest. Because of actual or potential erosion, this soil is in capability unit IIe–10. There are 890 acres in the county.

Calvin channery loam, 10 to 20 percent slopes, moderately eroded (CcC2).—A profile of this soil is described as representative of the series. On these slopes erosion is a serious hazard. The 1,978 acres are in capability unit IIIe–10.

Calvin channery loam, 20 to 30 percent slopes (CcD).—All but a few of the 651 acres of this soil are still heavily forested; hence, there has been little, if any, erosion. The slopes are great enough, however, so that any attempted cultivation would be hazardous. For this reason, the soil is placed in capability unit IVe–10.

Calvin channery loam, 20 to 30 percent slopes, moderately eroded (CcD2).—This soil is like the one just described, except that there has been active erosion. It is still suitable for some cultivation, however, if it is carefully managed and protected. The 224 acres are in capability unit IVe–10.

Calvin channery loam, 30 to 45 percent slopes (CcE).—Here are 859 acres that are steep but have not been eroded. Most of the acreage is in forest and probably should remain so. If cleared, it would be suitable for carefully controlled grazing and perhaps for occasional hay crops. It is in capability unit VIe–3.

Calvin channery loam, 45 to 60 percent slopes (CcF).—This is the steepest Calvin channery loam; the areas are in forest and should remain so. They are much too steep for safe cultivation, and growing hay or pasture would be hazardous and impractical. The 156 acres are in capability unit VIIe–3.

Calvin shaly loam, 0 to 10 percent slopes, moderately eroded (CmB2).—The profile of this Calvin soil is like the one described in detail, except that the coarse fragments are almost entirely shale, and there are very few, if any, flat pieces of hard, red sandstone in the surface layer. There may be some sandstone in the soil and substratum, however. This soil occupies only 189 acres, but the areas of it are important where they occur. Even on these fairly gentle slopes, there is some erosion hazard. The soil is classified in capability unit IIIs–2.

Calvin shaly loam, 10 to 20 percent slopes, moderately eroded (CmC2).—Erosion has been active on this Calvin soil. If the soil is managed carefully, some cultivated crops may be safely grown in fairly long rotations. This soil is in capability unit IVe–32. There are 126 acres in the county.

Calvin shaly loam, 10 to 20 percent slopes, severely eroded (CmC3).—On this soil, erosion has been so severe that cultivated crops should be grown only occasionally, and the soil should be in sod crops, such as hay or pasture, most of the time. Included with this shaly soil are some 46 acres that are somewhat channery in the surface layer. All of the 118 acres of this soil are in capability unit VIe–3.

Calvin shaly loam, 20 to 30 percent slopes (CmD).—This steep soil is not eroded, because the areas of it have been well protected by forests. If it were cultivated, however, the erosion hazard would be great. The 112 acres of this soil are in capability unit VIe–3.

Calvin shaly loam, 30 to 45 percent slopes (CmE).—Although there has been little or no erosion on this soil, cultivation should not be attempted. The soil could produce pasture, and grazing or hay crops could be attempted if managed carefully enough. There are 204 acres, in capability unit VIIe–3.

Calvin-Berks channery loams, 0 to 10 percent slopes, moderately eroded (CnB2).—This soil mapping unit and the next four described consist of mixtures of the reddish-brown to red Calvin channery loam and the yellowish-brown Berks channery loam. The areas of Calvin and of Berks soils in these units are distinct enough, but they are so small and intricately mixed that separation on the map was impractical. The most gentle and least eroded slopes of the complex are in this soil unit, which has an area of 1,565 acres and is in capability unit IIs–7.

Calvin-Berks channery loams, 10 to 20 percent slopes, moderately eroded (CnC2).—This mixture of Calvin and Berks soils occupies 2,798 acres and is in capability unit IIIe–32.

Calvin-Berks channery loams, 3 to 20 percent slopes, severely eroded (CnC3).—In this mixture of channery loams, there are some small spots of shaly loams. The soils have been too severely eroded for cultivation, except in very long rotations with especially good management and protection. The areas can be used safely for hay crops and pasture or for sodded orchards. The 320 acres in the county are in capability unit IVe–32.

Calvin-Berks channery loams, 20 to 30 percent slopes, moderately eroded (CnD2).—Most of the areas of this mapping unit have remained in forest, and, although there has been some erosion, it has not been severe. Because of the slope, the hazard of erosion would be great if cultivation were attempted. Therefore, the 1,289 acres are in capability unit IVe–32.

Calvin-Berks channery loams, 30 to 60 percent slopes, moderately eroded (CnF2).—These very steep soils occupy 1,315 acres. Woodland would be the safest use. The soils are in capability unit VIIe–3.

Calvin-Montevallo shaly loams, 0 to 10 percent slopes, moderately eroded (CoB2).—This unit and the next four described are intricate mixtures of Calvin shaly loam and Montevallo shaly loam. On these shaly and dominantly thin soils, erosion is less of a management problem than droughtiness and low fertility. The 103 acres of this mapping unit are in capability unit IIIs–2.

Calvin-Montevallo shaly loams, 10 to 20 percent slopes, moderately eroded (CoC2).—Slopes of these soils are great enough that erosion is the most significant management problem. The soils are also thin and droughty. There are 178 acres in capability unit IVe–32.

Calvin-Montevallo shaly loams, 20 to 30 percent slopes, moderately eroded (CoD2).—Because of the slope and the great hazard of erosion, cultivation of this mapping unit is hazardous. Some grazing can be done

if it is carefully managed and controlled. The 163 acres are in capability unit VIe–3.

Calvin-Montevallo shaly loams, 20 to 45 percent slopes, severely eroded (CoE3).—Little surface soil is left on these steep, severely eroded areas, and there are many gullies. In some places almost all the soil has been removed by erosion. These areas are of little value in agriculture, except for reforestation. The 134 acres are in capability unit VIIe–3.

Calvin-Montevallo shaly loams, 30 to 60 percent slopes (CoF).—These are steep areas that have not been eroded, because they remained almost entirely in forest. They are too steep for cultivation or for practical grazing and should remain in forest. There are 255 acres, in capability unit VIIe–3.

Chandler Series

The Chandler series consists of moderately deep, well-drained to somewhat excessively drained soils that have a weakly developed B horizon. The Chandler soils developed in materials that weathered from phyllite, a fine-grained, metamorphosed schist containing considerable mica. These soils are on fairly steep uplands and low mountains in the southern part of the county. They are mostly in the area just north of Harpers Ferry.

The Chandler soils are commonly associated with the Hazel soils, which are even shallower to bedrock. They occupy less than 1,000 acres.

A good part of the acreage has been cleared and is used for general farming and for orchards. These soils are extremely subject to erosion and must be very carefully managed.

Profile of Chandler channery silt loam, 0 to 10 percent slopes, in a forested area two-tenths of a mile west of Harpers Ferry Road, about three-tenths of a mile south of its intersection with Hoffmaster Road:

A_{11} 0 to 1 inch: very dark grayish-brown (10YR 3/2) channery silt loam; moderate, fine, crumb structure; soft when dry, very friable when moist, slightly plastic and slightly sticky when wet; roots abundant; about 10 percent phyllite fragments; neutral; clear, smooth boundary; horizon is ½ to 1 inch thick.

A_{12} 1 to 3 inches: yellowish-brown (10YR 5/4) channery silt loam; moderate, medium, crumb structure; moderately hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots plentiful; many fine and medium pores; about 25 percent stone fragments; slightly acid; clear, wavy boundary; horizon is 1 to 3 inches thick.

A_3 3 to 9 inches: brownish-yellow (10YR 6/6), channery, heavy silt loam or light silty clay loam; weak, medium, subangular blocky structure; moderately hard to hard when dry, moderately firm when moist, and plastic and sticky when wet; roots rather plentiful; many fine and some medium and larger pores; about 20 percent stone fragments; very strongly acid; clear, irregular boundary; horizon is 5 to 10 inches thick.

C_1 9 to 24 inches: brownish-yellow (10YR 6/6) very channery silt loam; inherited laminar structure; moderately hard when dry, firm when moist, and moderately plastic and sticky when wet; few roots; many fine and medium and some large pores; 60 to 70 percent stone fragments of all sizes, mostly well disintegrated; very strongly acid; gradual, irregular boundary; horizon is 12 to 20 inches thick.

C_2 24 to 48 inches +: yellow (10YR 7/6) mass of partially decomposed fragments of phyllite; hard when dry, very firm and compact when moist, and slightly plastic and slightly sticky when wet; a few large tree roots; rather slowly permeable; about 85 to 95 percent stone fragments, the remainder fine material with abundant mica flakes; extremely acid; very thick, grading with depth to hard, gray, greenish-gray, and yellowish-gray phyllite.

There is considerable range in depth to parent material. In some spots the subsoil has a reddish cast but is otherwise like that of the soil described. There are occasional stones, flagstones, or large slabs of phyllite on and within the soil. Some areas are almost free from stone fragments in the surface layer, thus are silt loam rather than channery silt loam in texture. These areas are not shown separately on the soil map, so all of the Chandler soils are undifferentiated units of Chandler silt loam and channery silt loam.

Chandler silt loam and channery silt loam, 0 to 10 percent slopes (CrB).—This is the soil described above, except that in some areas there are very few, if any, pieces of phyllite in the surface layer. This unit includes only gently sloping soils that have had little, if any, erosion, and they can be cultivated safely with good management. The 143 acres are in capability unit IIe–10.

Chandler silt loam and channery silt loam, 3 to 10 percent slopes, moderately eroded (CrB2).—Erosion has been active on the areas of this mapping unit. Better management and longer rotations are required for safe cultivation than on the similar uneroded soil. The 360 acres are in capability unit IIe–10.

Chandler silt loam and channery silt loam, 10 to 20 percent slopes, moderately eroded (CrC2).—These sloping soils are subject to erosion. Rotations must be long for safe cultivation, with only infrequent row crops in the cropping system and with long periods of sod crops, such as hay, pasture, or sodded orchards. The 342 acres of this mapping unit are in capability unit IVe–10.

Chandler silt loam and channery silt loam, 20 to 30 percent slopes (CrD).—Because these soils have remained in forest cover, they have not been eroded. It would be best to keep them in forest, although they could be grazed with care after establishment of a good sod. The 97 acres are in capability unit VIe–3.

Chewacla Series

The Chewacla series consists of moderately well drained soils on recent alluvial deposits along some of the smaller streams. The soils consist of materials that were washed originally from areas of soils developed from crystalline rocks—in Washington County mainly from soils of the Myersville, Fauquier, Highfield, Chandler, and Hazel series.

Because the Chewacla soils consist of recently deposited materials, there has not been sufficient time for the development of a B horizon in them. They are on the same flood plains as the well-drained Congaree soils and the poorly drained Wehadkee soils.

Most areas of Chewacla soils are small, and many of them have not been cleared. When cleared, they are used mostly for pasture and hay crops, but corn and other general crops are sometimes grown.

Profile of Chewacla silt loam, in a pastured area on the flood plain of a small creek 1 mile north of Dargan, just off the Harpers Ferry Road:

A_p 0 to 8 inches: dark grayish-brown (2.5Y 4/2) silt loam; weak, medium, crumb structure; moderately hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; strongly acid; clear, smooth boundary; horizon is 6 to 8 inches thick.

C 8 to 33 inches: light olive-brown (2.5Y 5/4) silt loam; about 15 percent very small specks of gray; moderate, medium, crumb structure; moderately hard when dry, somewhat firm when moist, and moderately plastic and sticky when wet; roots plentiful in upper portion, fewer below; many fine and medium pores; very strongly acid; abrupt, smooth to wavy boundary; horizon is 20 to 30 inches thick.

D_g 33 to 42 inches +: pale-olive (5Y 6/4) gravelly sandy loam; about 30 percent medium, distinct mottles of brown, yellow, and gray; moderate, medium, platy structure; hard when dry, moderately firm when moist, and slightly plastic and slightly sticky when wet; no roots; moderately slowly permeable to slowly permeable; about 20 percent waterworn gravel; extremely acid; grades with depth to gravelly sandy material.

The texture of the surface layer ranges from sandy loam to silt loam in the series, and there are gravelly and stony phases. Some areas are somewhat more brown than the profile described, especially where the soil materials originated in areas of reddish soils, such as the Fauquier. The Chewacla soils are not too poorly drained for many crops, but they are limited in crop production by the tendency to be flooded. The water table will vary, and in wet seasons it is likely to be near the surface for considerable periods.

Chewacla gravelly sandy loam (Cs).—This soil is like the one described, except that the surface layer is sandier and there is considerable waterworn gravel throughout. The soil is used mostly for late corn or for pasture and hay. It is in capability unit IIw–7, but, if very frequently damaged by flooding, it should be managed for grazing or perennial sod crops. The soil occupies 206 acres.

Chewacla silt loam (Ct).—This soil has the profile that has been described. It occupies nearly level flood plains. It is in capability unit IIw–7, but should be managed for sod crops and grazing if damaged by frequent overflows. Only an examination of each area of these soils and a consideration of their known history can determine whether or not there is frequent overflow damage. This information cannot be shown on the soil maps. There are 311 acres of this soil.

Chewacla stony silt loam (Cu).—This soil is on narrow flood plains, mostly along the western slopes of South Mountain between Pen Mar and Pondsville. It consists largely of local alluvium washed down from adjacent slopes that are generally occupied by stony Highfield or Fauquier soils. Stones and, in some places, boulders are so common that no attempt to farm this soil has been made. Included in these flood plains are small areas somewhat better drained than normal, and also some wet spots. The 157 acres of this soil are in capability unit Vs–2.

Congaree Series

The Congaree series consists of deep, well-drained soils on recent alluvium of the flood plains. These deposits consist of outwash from areas of soils on crystalline rocks. The Congaree soils are mostly in the southern part of the county near Harpers Ferry. On the same flood plains are the moderately well drained Chewacla soils and the poorly drained Wehadkee soils.

The Congaree soils are of very little extent or importance in Washington County. Although they are good soils, they occupy very small and narrow areas, and amount to less than 100 acres. Both the silt loam and the gravelly loam occur, but, because of their very small extent, they are mapped together as Congaree silt loam and gravelly loam.

Profile of Congaree silt loam, in a forested area just off Shinan Road, 1¼ miles northwest of its south intersection with Harpers Ferry Road:

A_1 0 to 5 inches: dark-brown (10YR 4/3) silt loam; weak, fine to medium, crumb structure; slightly to moderately hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; slightly acid to neutral; gradual, smooth boundary; horizon is 4 to 7 inches thick.

C 5 to 39 inches: dark yellowish-brown (10YR 4/4) silt loam or heavy fine sandy loam; no apparent structure; slightly hard when dry, friable to very friable when moist, and moderately plastic but nonsticky when wet; roots plentiful in upper portion; moderately permeable; contains a few mica flakes; slightly acid; clear to abrupt, smooth boundary; horizon is 30 to 40 inches thick.

D 39 to 48 inches +: yellowish-brown (10YR 5/4), stratified sand, silt, and gravel; no structure; consistence variable; no roots; many mica flakes; strongly acid.

Some profiles of Congaree soils are a little more reddish, particularly in the upper C horizon, than the one described. Gravel may be present throughout the profile. These soils are well drained and of fairly high fertility and moisture-supplying capacity. However, many areas in Washington County are so small that they have not been cleared for use.

Congaree silt loam and gravelly loam (Cv).—The Congaree soils are in capability unit I–6. These soils are suitable for nearly all crops. They do have a hazard of flooding, but are flooded very infrequently, and corn and other crops can be planted after the danger of flooding has passed. There are only 86 acres of these soils in the county.

Corydon Series

The Corydon series consists of shallow soils developed from limestone of various degrees of purity in the Great Valley of Washington County. The Corydon soils generally are on long ridges somewhat above most of the valley. They are young soils, shallow to bedrock, and many areas are rocky to extremely rocky because of the many outcrops of limestone.

Corydon soils differ from the Hagerstown soils of the same valley. They are much less red than the Hagerstown soils, have a much more weakly developed profile, and are invariably shallow to bedrock. The Hagerstown soils are normally deep.

The Corydon soils are used extensively for pasture. Where there are few or no outcrops of limestone, they are sometimes used for general crops, but they tend to be droughty because of their shallow depth over the rock.

Profile of Corydon clay loam, 0 to 3 percent slopes, in an area of cutover forest about 200 yards west of Fairview Church Road, three-tenths of a mile south of the Pennsylvania State line:

- A_1 0 to 4 inches: dark-brown (7.5YR 3/2) clay loam or heavy silty clay loam; moderate, medium, crumb structure; moderately hard to hard when dry, friable to somewhat firm when moist, and moderately plastic and sticky when wet; roots abundant; slightly acid; clear to abrupt, smooth to wavy boundary; horizon is 1 to 4 inches thick.
- B_2 4 to 13 inches: strong-brown (7.5YR 5/8) clay loam, very slightly variegated or variable in color; moderate, medium to strong, blocky structure; very hard when dry, firm when moist, and plastic and sticky when wet; roots rather plentiful; many fine but few large pores; slightly acid; abrupt, wavy to irregular boundary; horizon is 2 to 12 inches thick.
- C 13 to 14 inches: variegated reddish and yellowish to almost white, structureless gritty clay; very hard when dry, firm when moist, and plastic and sticky when wet; mildly alkaline; abrupt, irregular to broken boundary; horizon is 1 to 3 inches thick.
- D_r 14 inches +: hard, dark-gray limestone containing many fine quartz impurities.

There is rather great variability in the Corydon soils. Colors range from yellowish through brown to almost red, and depth ranges from practically none to as much as 20 inches or more. Either the A, B, or C horizon may be absent in places, especially the C horizon, where the subsoil rests abruptly on bedrock. The limestone bedrock may be fairly pure or may contain considerable chert or, in places, shale.

The Corydon soils are well drained, and the very shallow areas are excessively drained. They tend to be droughty, and have a low or very low moisture-supplying capacity. They are fertile enough and would be productive if moisture deficiences could be corrected.

Corydon clay loam, 0 to 3 percent slopes (CwA).—This is the best soil of the Corydon series in the county. It has the profile described. There are few outcrops of limestone. The clay loam surface soil tends to be rather hard and intractible when only slightly too dry, and sticky and plastic and tends to form clods if it is plowed when slightly too wet. Even at optimum moisture content, the soil is difficult to plow and cultivate. The 309 acres of this soil are classified in capability unit IIIs–2.

Corydon clay loam, 3 to 8 percent slopes, moderately eroded (CwB2).—The slope of this clayey soil is great enough that runoff is fairly rapid. The resulting erosion hazard is probably of more significance than the difficulty of handling, although that problem is also an important one. The 1,006 acres of this soil are in capability unit IIIe–30.

Corydon clay loam, 8 to 15 percent slopes, moderately eroded (CwC2).—This soil tends to be shallower than the more gently sloping Corydon soils. There is greater danger of erosion, and there may be more outcrops of rock. With very good management, crops can be grown, although most of this soil is used for pasture. The 200 acres are in capability unit IVe–1.

Corydon extremely rocky clay loam, 0 to 15 percent slopes (CxC).—This soil has a profile like the one described in detail, but there are extremely numerous outcrops of limestone. These outcrops and extremely shallow areas occupy as much as 90 percent of the surface in many places. Tillage of any kind is out of the question, and the surface is too rocky for mowing, except by hand. Best uses of this soil would be for woodlots or for very limited grazing. The 405 acres are in capability unit VIIs-1.

Corydon very rocky clay loam, 3 to 45 percent slopes, moderately eroded (CyE2).—This soil has a profile like the Corydon clay loam described, but it has many outcrops of limestone and areas of thin soil over bedrock. It is not nearly so rocky, however, as the Corydon extremely rocky clay loam; in most places between 25 to 40 percent of the surface is affected by rock. Erosion has been active in many places. Tillage is not impossible, but, because of the rocks, steep slope, and erosion hazard, it is generally impractical. The soil is best suited to pasture or woodland and is in capability unit VIs-1. There are 857 acres.

Dekalb Series

The Dekalb series consists of excessively drained, extremely acid, shallow, stony soils on light-colored, quartzitic sandstone in high parts of the county.

Profile of Dekalb very stony sandy loam, 0 to 25 percent slopes, in a forested area near the summit of Sideling Hill, on Riser Road three-tenths of a mile south of its intersection with U.S. Highway No. 40:

- A_1 0 to 1/2 inch: black (10YR 2/1) very stony sandy loam; weak, fine, granular structure; soft when dry, very friable when moist, and nonplastic and nonsticky when wet; roots plentiful; very strongly acid; abrupt, wavy boundary; horizon is 0 to 1 inch thick.
- A_2 1/2 to 1 inch: dark-gray (5Y 4/1) very stony sandy loam; single-grain structure; very low density with ashy appearance; soft and floury when dry, loose when moist, and nonplastic and nonsticky when wet; roots plentiful; very rapidly permeable; extremely acid; abrupt, wavy boundary; horizon is 0 to 1 inch thick.
- B 1 to 15 inches: yellow (10YR 7/6) very stony and very channery sandy loam; very weak, medium crumb to granular structure; soft to very slightly hard when dry, loose to very friable when moist, and nonplastic and nonsticky when wet; a few large, woody roots; very rapidly permeable; 50 to 70 percent stones and flagstones of quartzitic sandstone; extremely acid; gradual, irregular boundary; horizon is 10 to 20 inches thick.
- C 15 to 43 inches: brownish-yellow (10YR 6/6), extremely channery and stony loamy sand or gritty sandy loam; no structure; loose when dry or moist, and nonplastic and nonsticky when wet; a very few woody roots; very rapidly to extremely permeable; ranges from about 70 percent rock fragments in upper part to almost solid rock at 43 inches; extremely acid; gradual to abrupt, irregular to broken boundary; horizon is 2 to 6 feet thick.
- D_r 43 inches +: very hard, light-colored, quartzitic sandstone.

Either of the surface layers may be absent, more often the A_2 horizon. Both are absent in cultivated or eroded areas. In places there is a very thin, dark-brown, stained layer at the upper boundary of the B horizon. This is a distinct soil horizon, but, when present, it is seldom as much as one-fourth inch thick.

Dekalb and Leetonia very stony sandy loams, 0 to 25 percent slopes (DeD).—This mapping unit consists of both Dekalb and Leetonia very stony sandy loams. These soils are not suited to crops or pasture. Most of the areas are in forest, and forestry is probably their most economic use. There are 1,762 acres, in capability unit VIIs–2.

Dekalb and Leetonia very stony sandy loams, 25 to 45 percent slopes (DeE).—On these steep soils the manage-

ment of timber is difficult. However, there is little other opportunity for economic return. There are 1,056 acres, in capability unit VIIs–2.

Dekalb and Leetonia very stony sandy loams, 45 to 60 percent slopes (DeF).—These steep slopes are so rough and inaccessible that they are almost impossible to manage as timberland. They need to remain in forest, however, for watershed protection and wildlife cover. They should be useful for park and recreational purposes. The 201 acres are in capability unit VIIs–2.

Dekalb and Lehew very stony loams, 0 to 25 percent slopes (DkD).—This unit consists chiefly of very stony loams of the Dekalb and the Lehew series. The Dekalb soil of this unit has a profile like the one described in detail, except that it is somewhat finer textured throughout. The profile of the Lehew soil is like the one described for the Lehew series. Included also are some small areas in which the stones are remnants of hard, cherty limestone. These soils are much too stony for cultivation, and grazing would be poor, hazardous, and impractical. Woodland is the most suitable and economic use. The 281 acres are in capability unit VIIs–2.

Dekalb and Lehew very stony loams, 25 to 45 percent slopes (DkE).—These are steep soils. Although they are in capability unit VIIs–2, their steepness and roughness limit harvesting of the trees that will grow, so the soils are less useful than those that are not so steep. There are 493 acres, of which about 76 acres have a slope steeper than 45 percent, and about 11 acres contain some outcrops of limestone.

Duffield Series

The Duffield series consists of deep, well-drained soils in many parts of the limestone valleys on limestone interbedded with thin seams of shale. The Duffield soils have a profile similar to that of the Hagerstown soils, but they are dominantly yellowish instead of reddish and the subsoil is not quite so fine textured. The Duffield soils are also similar to the Frankstown soils, but they are deeper, on the average, and their parent material contains less shale and chert.

The Duffield soils are most extensive in the central and eastern parts of the Great Limestone Valley. They are excellent agricultural soils and, next to the Hagerstown, they are the most extensive soils in the county. The Duffield soils are fertile and highly productive under good management. They are limited in use only by the hazard of erosion and, in some places, by stones or rock outcrops.

Profile of Duffield silt loam, 0 to 3 percent slopes, in a cultivated area just south of U.S. Highway No. 40, two-tenths of a mile northwest of its intersection with Cool Hollow Road:

A_p 0 to 8 inches: yellowish-brown (10YR 5/4) silt loam; moderate, fine, crumb structure; slightly to moderately hard when dry, friable when moist, and moderately plastic and moderately sticky when wet; roots abundant; slightly acid to neutral; clear, smooth boundary; horizon is 6 to 8 inches thick.

B_{21} 8 to 14 inches: brownish-yellow (10YR 6/6), light silty clay loam; moderate, fine, subangular blocky structure; moderately hard when dry, friable to slightly firm when moist, and moderately plastic and moderately sticky when wet; roots plentiful; many fine and medium pores; upper surface apparently a plowsole, being somewhat compacted; medium acid; gradual, wavy boundary; horizon is 4 to 7 inches thick.

B_{22} 14 to 28 inches: reddish-yellow (7.5YR 6/6) silty clay loam; strong, medium, blocky and subangular blocky structure; hard to very hard when dry, firm when moist, and plastic and sticky when wet; roots plentiful in upper portion; abundant fine and some medium pores; patchy, self-colored clay skins and some scattered, black films on aggregates; slightly acid; gradual, wavy boundary; horizon is 12 to 20 inches thick.

B_{23} 28 to 48 inches: variegated reddish-yellow (7.5YR 6/6 and 7/8) silty clay loam; strong, medium to coarse, blocky structure; very hard when dry, firm when moist, and plastic and sticky when wet; practically no roots; moderately slowly permeable; strong but discontinuous, self-colored clay skins and abundant black films on aggregates; neutral; gradual, wavy boundary; horizon is 12 to 24 inches thick.

C 48 to 60 inches +: speckled, streaked, and variegated strong-brown, reddish-yellow, pale-yellow, and black silty clay loam containing about 50 percent partially decomposed hard shale; weak, coarse, irregular, blocky to slightly laminar structure; hard when dry, very firm when moist, and plastic and very sticky when wet; no roots; neutral.

The thickness of the soil is variable, but all Duffield soils are normally deep. Depth to the substratum ranges from about 36 to as much as 60 inches. In places a few fragments of shale are in the profile. There may be occasional outcrops of shaly limestone, and some areas are very rocky to extremely rocky because of outcropping ledges. Nearly all crops are grown on the Duffield soils, including much hay and pasture. Only small areas are in orchard, however, probably because air drainage is not good enough in most valley positions.

Duffield extremely rocky silt loam, 0 to 15 percent slopes (DuC).—This soil is like the silt loam described except that from about 40 to nearly 90 percent of the surface is occupied by outcrops of shaly limestone. Slopes are not great and erosion has not been especially active, but the soil is much too rocky for cultivation or for good pasture management. This soil will furnish some very limited grazing, and it makes excellent woodlots. There are 1,279 acres, in capability unit VIIs–1.

Duffield silt loam, 0 to 3 percent slopes (DmA).—This soil has the profile that is described as representative of the series. It is the best Duffield soil, suited to all crops, highly productive, and not subject to deterioration under ordinary good farming practices. The 3,352 acres are in capability unit I–1.

Duffield silt loam, 3 to 8 percent slopes, moderately eroded (DmB2).—These moderate slopes of Duffield silt loam have had some soil removed by erosion, but the soil is still an excellent one and is highly productive under good management. This soil occupies 16,338 acres. It is in capability unit IIe–1. About 32 scattered acres have been severely eroded.

Duffield silt loam, 8 to 15 percent slopes, moderately eroded (DmC2).—This soil is suited to all the crops of the area, but it should have longer rotations and more careful erosion-control measures than the similar but more gently sloping soil. The 4,739 acres are in capability unit IIIe–1.

Duffield silt loam, 8 to 25 percent slopes, severely eroded (DmD3).—On this soil, erosion has been so damaging that great care must be used if the soil is to continue to produce any clean-cultivated crops. Long rotations are in order, so that the soil is under sod most of the time. The 99 acres are in capability unit IVe–1.

Duffield silt loam, 15 to 25 percent slopes, moderately eroded (DmD2).—This soil is fairly steep, but erosion has not been especially active. Long rotations, with sod crops at least 4 out of 5 years, will help protect the soil against further damage. There are 669 acres, in capability unit IVe–1.

Duffield very rocky silt loam, 3 to 15 percent slopes (DvC).—This soil is very much like the others of the series that have a similar range of slope, except that from about 25 to 40 percent of the surface is occupied by limestone outcrops. In some places between outcrops, the soil is shallow or very shallow over ledges of limestone. The soil is too rocky for regular cultivation. It is excellent for permanent pasture or for woodland, but, if pastures are overgrazed, the soil will be subject to some deterioration. There are 1,895 acres, in capability unit VIs–1.

Duffield very rocky silt loam, 8 to 45 percent slopes, moderately eroded (DvE2).—This soil is also very rocky; the slope of some areas is steep, and erosion has been active. If used for well-managed improved pasture or for woodland, further erosion can be practically eliminated. The 178 acres are in capability unit VIs–1.

Dunmore Series

The Dunmore series consists of well-drained, deep soils with a very fine textured subsoil, on ridges of cherty limestone in the western part of the county. These ridges lie above most of the other soils of the immediate areas. Higher than the Dunmore soils, in some places on the same ridges, are soils of the Elliber and Frederick series.

The Dunmore soils are not extensive, since they occupy less than 100 acres, but they are important where they occur. They are very productive under good management and are used for all crops. In the Hancock area, the Dunmore soils are especially well liked for orchards.

Profile of Dunmore cherty silt loam, 3 to 8 percent slopes, moderately eroded, in a woodland 75 yards east of U.S. Highway No. 522 just north of Hancock and about six-tenths of a mile south of the Pennsylvania State line:

A_1 0 to 6 inches: very dark brown (10YR 2/2) cherty silt loam; strong, fine, crumb to granular structure; slightly to moderately hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; strongly acid; clear to abrupt boundary; horizon is 4 to 6 inches thick.

A_2 6 to 11 inches: dark-brown (10YR 4/3) cherty silt loam; moderate, fine, crumb to granular structure; moderately hard when dry, friable when moist, and moderately plastic and moderately sticky when wet; roots plentiful; many pores of all sizes; medium acid; clear, abrupt boundary; horizon is 3 to 6 inches thick.

B_{21} 11 to 21 inches: yellowish-brown (10YR 5/6) very cherty silty clay loam; moderate, fine to medium, subangular blocky structure; moderately hard to hard when dry, moderately firm when moist, and plastic and sticky when wet; roots rather few; many fine and medium pores; medium acid; gradual, wavy boundary; horizon is 8 to 18 inches thick.

B_{22t} 21 to 40 inches: strong-brown (7.5YR 5/8), cherty, heavy clay loam to clay; very slightly and faintly streaked with reddish yellow and yellowish red (7.5YR 6/8 and 5YR 5/6); strong, medium to coarse, blocky structure; hard when dry, firm when moist, and sticky and very plastic when wet; a very few roots; many fine but few large pores; thin, self-colored clay skins common; strongly to very strongly acid; gradual, wavy boundary; horizon is 14 to 20 inches thick.

B_{3t} 40 to 54 inches +: coarsely variegated, yellowish-red and yellowish-brown (5YR 5/6 and 10YR 5/8) clay; compound, weak, medium, platy and very strong, medium, blocky structure; hard when dry, firm when moist, and plastic and sticky when wet; a few isolated roots; common, heavy, red clay skins and a few black films on aggregates; practically no chert; strongly to very strongly acid; grades with depth, first to disintegrated limestone, and finally to hard, cherty limestone.

There is very little variation in the Dunmore soils in Washington County. Although they are well enough drained, these soils have slow overall permeability because of the fine-textured lower subsoils.

Dunmore cherty silt loam, 3 to 8 percent slopes, moderately eroded (DyB2).—Most of this soil is used for orchards. The soil is well suited to this use and is suitable for all the common crops. There are 44 acres, in capability unit IIe–1.

Dunmore cherty silt loam, 8 to 15 percent slopes, moderately eroded (DyC2).—This soil needs especially good management to control erosion, as runoff is rapid on a soil with heavy subsoil on such slopes. This soil is suitable for all crops. It occupies 50 acres and is in capability unit IIIe–1.

Dunning Series

The Dunning series consists of very poorly drained, dark-colored soils in recently deposited alluvial materials. The Dunning soils are on flood plains and are made up chiefly of materials washed from areas of limestone and limestone soils. They are present, along with soils of the Huntington, Lindside, Melvin, and in places the Warners series, on these flood plains, mostly along the smaller streams within the limestone valley sections of the county.

The Dunning soils are fairly extensive and are widespread in the county. They were not mapped by themselves in this county. They were mapped only in combination with many small areas of Melvin soils, which have a lighter gray surface layer and are not quite so poorly drained. The Melvin soils are described elsewhere in their regular alphabetical order.

Profile of Dunning silty clay loam, in a natural meadow area about 75 yards west of State Road No. 64, two-tenths of a mile north of its intersection with Gardenhour Road:

A_{11} 0 to 3 inches: very dark brown (10YR 2/2) silty clay loam; no apparent structure; hard to very hard when dry, friable when moist, plastic and sticky when wet; roots abundant; this horizon apparently consists of fairly recent overwash material; mildly alkaline; gradual, smooth boundary; horizon is 2 to 4 inches thick.

A_{12g} 3 to 6 inches: very dark grayish-brown (10YR 3/2) silty clay loam; about 20 percent medium, faint mottles of dark olive gray (5Y 3/2); very weak, coarse, crumb structure; hard when dry, friable when moist, and plastic and sticky when wet; roots plentiful to abundant; this horizon also is apparently fairly recent overwash; mildly alkaline; clear to abrupt, smooth boundary; horizon is 2 to 3 inches thick.

A_{13gb} 6 to 12 inches: dark olive-gray (5Y 3/2) silty clay loam; about 10 percent medium, distinct mottles of dark yellowish brown (10YR 4/4); very weak, coarse, blocky structure; moderately hard to hard when dry, friable to rather firm when moist, and plastic and sticky when wet; roots fairly plentiful; gritty, containing a noticeable amount of fine and medium

sand; this is apparently a much older A horizon that has been buried by overwash; mildly alkaline; abrupt, smooth boundary; horizon is 4 to 8 inches thick.

C_{1g} 12 to 18 inches: black (5Y 2/1) very fine sandy clay loam slightly streaked with olive (5Y 4/3); compound, weak, very coarse platy and weak, medium to coarse, blocky structure; moderately hard to hard when dry, firm when moist, and sticky and very plastic when wet; few roots; abundant very fine pores; neutral; gradual, smooth boundary; horizon is 5 to 8 inches thick.

C_{2g} 18 to 32 inches: very dark gray (5Y 3/1), very dense fine sandy clay with a slight bluish cast; moderate, medium, platy and moderate, fine, blocky structure; hard when dry, firm and brittle when moist, and sticky and very plastic when wet; a very few roots in upper portion; slowly permeable; mildly alkaline; abrupt, smooth boundary; horizon is 12 to 20 inches thick.

D_g 32 to 42 inches +: very dark gray (5Y 3/1) fine gravelly coarse sandy loam to loamy coarse sand; no structure; slightly to moderately hard when dry, friable when moist, and nonplastic but very slightly sticky when wet; no roots; rapidly permeable; this is a water-bearing stratum of low density, with distinct flowage when saturated; mildly alkaline.

The overwash layers are not present everywhere, and in some places they are thicker than those described. The subsoil in some places is lighter gray and the mottling is more prominent than in the typical profile. The surface layer may be darker with a higher content of organic matter. The Dunning soils have a high water table and very slow runoff. They are practically level in most places.

Dunning and Melvin silty clay loams (Dz).—Because they are poorly drained to very poorly drained, generally difficult to drain artificially, and subject to frequent flooding, these soils are placed in capability unit VIw–1. Management for pasture appears to be the most feasible use. There are 1,896 acres. In some places the surface is more nearly silt loam than silty clay loam, but this makes no difference in use and management. This mapping unit is about 60 percent Dunning silty clay loam, and about 40 percent Melvin silty clay loam. In some places the two soils merge into each other gradually.

Edgemont Series

The Edgemont series consists of deep, well-drained, acid soils that developed in place in the weathered residue from hard quartzitic sandstone. The Edgemont soils occur on resistant valley ridges and on the lower slopes and spurs of mountains. In Washington County they are mostly on the lower slopes and spurs of South Mountain and Elk Ridge and close to the Potomac River in the area just north of Harpers Ferry, but some areas are in the western part of the county.

Although the Edgemont soils are not highly productive, they are suited to most crops grown in the county. They are particularly well liked for orchards and berry crops because they generally have good air drainage.

Profile of Edgemont channery loam, 0 to 12 percent slopes, in a forested area just off Shinan Road, 2 miles northwest of its intersection with Harpers Ferry Road, just south of Dargan:

A_1 0 to 4 inches: very dark gray (10YR 3/1) channery loam; moderate, very fine, granular structure; soft when dry, very friable when moist, and nonplastic and nonsticky when wet; roots abundant; slightly acid; abrupt, wavy boundary; horizon is 2 to 5 inches thick.

A_2 4 to 12 inches: light yellowish-brown (10YR 6/4) channery loam; moderate to strong, fine, crumb structure; slightly hard when dry, friable when moist, and sticky and slightly plastic when wet; roots plentiful; some fine and medium and many large pores and root channels; medium acid; clear, wavy boundary; horizon is 6 to 8 inches thick.

B_{21} 12 to 22 inches: brownish-yellow (10YR 6/6), channery, gritty, heavy loam; moderate, medium, blocky and subangular blocky structure; moderately hard to hard when dry, moderately firm when moist, and moderately plastic and moderately sticky when wet; roots few; some fine and abundant medium pores; strongly acid; gradual, wavy boundary; horizon is 8 to 12 inches thick.

B_{22} 22 to 35 inches: yellow (10YR 7/8), channery, gritty, heavy loam or light sandy clay loam; moderate to strong, medium, blocky and subangular blocky structure; hard when dry, firm when moist, and plastic and moderately sticky when wet; very few roots; many fine and medium pores, contains a few mica flakes; strongly acid; gradual to clear, wavy boundary; horizon is 12 to 20 inches thick.

B_{3m} 35 to 41 inches: mottled or variegated yellow, brownish-yellow, and yellowish-red, channery and gritty silt loam to light silty clay loam; weak to moderate, medium, platy structure; hard when dry, firm and brittle when moist, plastic and sticky when wet; no visible roots; pores very fine, mostly filled with clay; brownish-yellow, silty coatings on major aggregated surfaces; this is a thin, rather weakly developed siltpan or fragipan that is not always present in the profile; considerable very fine quartzite gravel; strongly acid; gradual, wavy boundary; horizon is 0 to 8 inches thick.

C 41 to 50 inches: variegated red, yellow, and brownish-yellow, very gritty and channery sandy clay; massive; hard when dry, firm when moist; no roots; strongly acid; clear to abrupt, irregular boundary; horizon is 10 to 22 inches thick.

D_r 50 inches +: hard, flaggy to slabby, quartzitic sandstone.

There is considerable variation in the content of flags, stones, and fine gravel. The depth through the subsoil ranges from about 24 inches to 40 or more. The silty fragipan may not be present everywhere, and, when it is present, it is sometimes difficult to distinguish it from the parent material of the upper substratum.

In Washington County the Edgemont soils were not mapped by themselves. They were mapped in undifferentiated units with some of the soils of the Laidig series. The soils of these two series are so similar, so closely associated, and in some places so mixed that they were mapped together.

Edgemont and Laidig channery loams, 0 to 12 percent slopes (EdC).—This mapping unit is made up of Edgemont channery loam, along with areas of Laidig channery loam that have the same range of slope. These soils are suitable for cultivated crops, but they are not highly productive for general crops, and they are subject to erosion. There are 1,493 acres in the county, in capability unit IIe–4.

Edgemont and Laidig channery loams, 5 to 20 percent slopes, moderately eroded (EdD2).—Erosion has been active on these soils. The soils may be cultivated with care, but high yields should not be expected, except perhaps from orchard and berry crops. There are many small areas, most of them marked on the soil maps, where erosion has been more severe. These spots should receive special treatment to prevent further soil loss or damage.

There are 4,613 acres of these soils in the county, in capability unit IIIe–4.

Edgemont and Laidig channery loams, 20 to 35 percent slopes, moderately eroded (EdE2).—On these hilly soils there is a strong hazard of erosion. For this reason, the 2,870 acres are placed in capability unit IVe–3. There are many more severely eroded, small areas on which no cultivation should be attempted, except perhaps for hay crops or sodded orchards. These severely eroded spots are shown on the soil map.

Edgemont and Laidig channery loams, 35 to 60 percent slopes, moderately eroded (EdF2).—These soils are steep, but, if kept in good sod, they could be safely grazed on a limited or occasional basis. Otherwise, they should be kept in forest or planted to forest. There are 291 acres, in capability unit VIe–2.

Edgemont and Laidig very stony loams, 0 to 5 percent slopes (EgA).—The soils of this unit are either Edgemont or Laidig soils, but on the average about 40 to 50 percent of the surface is occupied by stones and occasional boulders and rock outcrops. Some of these areas may be mowed, but general cultivation is impractical. If they remain in forest or are used for pasture, these soils are not subject to deterioration. The 127 acres are in capability unit Vs–2.

Edgemont and Laidig very stony loams, 5 to 35 percent slopes (EgD).—These soils have enough slope that they will erode under use as pasture if they are not well managed. Stoniness is the most limiting factor. The soils are suitable for controlled grazing or for woodland. Timbering should be both practical and economical. There are 12,524 acres of these soils in the county, in capability unit VIs–2.

Edgemont and Laidig very stony loams, 35 to 60 percent slopes (EgF).—These soils are so stony and steep that they are of little agricultural importance, except for their natural timber. Timber operations will be difficult, and forest management, especially restocking artificially, may not be practical. There are 771 acres, in capability unit VIIs–2.

Elliber Series

The Elliber series consists of deep, well-drained soils on sharp ridges of very impure, cherty limestone in the Appalachian ridge and valley section of the western part of the county. In many places the Elliber soils are near areas of the Frederick and the Dunmore soils. They are less red than the Frederick soils and do not have a heavy subsoil like that of the Dunmore soils.

These soils are fairly extensive. They are fairly fertile and productive, but they are not widely used for agriculture because of the dominant steep slopes, They are popular for orchards, especially in the Hancock area.

Profile of Elliber cherty loam, 5 to 12 percent slopes, moderately eroded, at a point one-fourth mile west of Hollow Road, seven-tenths of a mile south of the Pennsylvania State line:

A_1 0 to 2 inches: black (10YR 2/1) cherty loam; weak, fine, granular structure; soft when dry, very friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; slightly acid; clear, wavy boundary; horizon is 1 to 3 inches thick.

A_2 2 to 8 inches: dark-brown (10YR 4/3), gritty, cherty loam; weak, medium, granular structure; slightly hard when dry, very friable when moist, and slightly plastic and slightly sticky when wet; roots plentiful to abundant; many pores of all sizes; medium acid; clear, wavy boundary; horizon is 5 to 8 inches thick.

B_2 8 to 31 inches: yellowish-brown (10YR 5/4), gritty, cherty, heavy loam; weak to moderate, medium, subangular blocky structure, readily crushing to single grains; moderately hard when dry, friable when moist, and moderately plastic and moderately sticky when wet; roots plentiful; moderately rapidly permeable or rapidly permeable; strongly acid; gradual, wavy to irregular boundary; horizon is 20 to 28 inches thick.

B_3 31 to 39 inches: yellowish-brown (10YR 5/4), very gritty and very cherty, light silt loam; very weak, medium, subangular blocky structure; moderately hard when dry, friable when moist, slightly plastic and slightly sticky when wet; roots fairly numerous; moderately rapidly permeable or rapidly permeable; strongly acid; abrupt, irregular boundary; horizon is 8 to 15 inches thick.

D_r 39 inches +: ledges of hard, cherty limestone.

In many places there is a thin C horizon or layer of soft, decomposed rock just above the hard bedrock. There is considerable variation in the amount of chert in the soil, and in some places there are outcrops or boulders of hard, cherty limestone. In some places the subsoil is a little redder than that in the profile described, particularly in areas close to soils of the Frederick series. Locally, drainage may be somewhat excessive, particularly in spots where the content of chert is high. Deep-rooted sod crops, including well-sodded orchards, are especially suited to these soils.

Elliber cherty loam, 5 to 12 percent slopes, moderately eroded (EhB2).—The slope of this soil is moderate, and there has been some active erosion. However, the soil is suited to general cultivation under good management. There are 520 acres, in capability unit IIe–26.

Elliber cherty loam, 12 to 25 percent slopes, moderately eroded (EhD2).—The slope of this soil is steep enough that intensive protection must be provided if cultivated crops are grown. The soil is widely used for orchards. The 719 acres are in capability unit IIIe–26.

Elliber cherty loam, 25 to 45 percent slopes, moderately eroded (EhE2).—On these steep slopes there has been some erosion. Clean cultivation should be avoided wherever possible, but the soil is well suited to orchards and sod crops. There are 629 acres, in capability unit VIe–1.

Elliber cherty loam, 45 to 55 percent slopes (EhF).—This is the steepest Elliber soil. Practically all of the areas are in forest and should remain so. There are 81 acres, including 15 acres that have a somewhat redder subsoil than normal. This soil could be used for limited grazing, or for forestry, but cultivation would be impractical. It is in capability unit VIIe–1.

Eroded Land

There are many areas in all parts of Washington County that have been severely eroded until they no longer are true soils, but rather remnants of soil materials. Although in most places the original soil series can be estimated from what remains, a more uniform and satisfactory classification of such land can be made by simply naming the kind of soil material involved.

In Washington County these severely eroded soils can be divided into four groups according to parent material: Greenstone materials, limestone materials, sandstone and quartzite materials, and shale and schist materials. No profile descriptions are given, because in most places there are no complete soil profiles remaining.

Eroded land, greenstone materials (Em).—This severely eroded soil occupies scattered areas, mostly in Pleasant Valley. Adjacent soils are generally of the Fauquier and Myersville series. The remaining material consists mostly of soft, decomposed greenstone or metabasalt, with many fragments of harder rock. In some places there is a little soil left between gullies, but the gullies are either very close, or very deep, or both. In other places sheet erosion has removed all of the true soil, leaving only rough and gullied parent material or, in places, bedrock. Slopes range from about 10 to 45 percent.

Such areas are not suitable for crops, and, as a rule, are not suited even to grazing. Vegetation can be reestablished, however, if care and effort are used to do so. Although these areas are of little value in themselves, they should have treatment to prevent their enlargement. They are always hazards to other land, because runoff from them will cause erosion damage to spread. If revegetated, they will not only be less of a threat to agricultural land, but they can be of some value as wildlife protection areas or as woodlots. There are 101 acres of this kind of eroded land in the county, in capability unit VIIe–2.

Eroded land, limestone materials (En).—This land consists of severely eroded areas of what were once soils of the Duffield, Frankstown, Frederick, Hagerstown, and Murrill series. Rocky areas are not included. Because these materials were derived from or underlain by limestone, they are potentially somewhat more fertile and useful than many of the severely eroded, nonlimestone areas. Because of this, they are placed in capability unit VIIe–1. There are 617 acres in the county.

Eroded land, sandstone and quartzite materials (Er).—These are scattered remnants of what were once soils of the Dekalb, Edgemont, Holston, Monongahela, and Waynesboro series. The areas have been very severely eroded and are strongly or very strongly acid. Reestablishing some kind of protective vegetation is likely to be more difficult than on areas of greenstone or limestone materials. The 221 acres are in capability unit VIIe–2.

Eroded land, shale and schist materials (Es).—This land consists of areas that were the shallow and somewhat droughty Buchanan, Berks, Calvin, Hazel, Litz, Chandler, Talladega, Teas, or Montevallo soils. It has been very severely eroded, and, with only the underlying shaly or channery parent material, or in places bare bedrock remaining, revegetation may be slow and difficult. It will be worthwhile if some protection of adjacent lands is accomplished. There are 3,890 acres of this land in the county, in capability unit VIIe–3.

Etowah Series

The Etowah series consists of deep, well-drained, red soils on old stream terraces. The materials from which these soils have been developed are very old deposits of alluvium that originally washed from areas of soils on limestone. The Etowah soils are in the same localities as the Hagerstown, Duffield, and Frankstown soils of the valley uplands and the Huntington, Lindside, and other soils of the flood plains or bottom lands.

The Etowah soils strongly resemble the Waynesboro soils, but the Waynesboro soils have developed in sandstone and shale materials on the terraces instead of in limestone materials. The Etowah soils, as a rule, are only slightly acid, but the Waynesboro soils are very strongly acid.

The Etowah soils are fertile and productive and are mostly in crops or pastures. Only a few small areas remain in woodland.

Profile of Etowah gravelly loam, 0 to 3 percent slopes, at a point in a cultivated area 30 yards south of State Road No. 60, about six-tenths of a mile west of State Road No. 62, on a terrace of Antietam Creek just west of Leitersburg:

A_p 0 to 9 inches: yellowish-brown (10YR 5/4), gravelly, heavy loam; moderate, fine, crumb structure; moderately hard when dry, friable when moist, slightly plastic and slightly sticky when wet; roots abundant; about 15 percent waterworn chert gravel; medium acid; abrupt, smooth boundary; horizon is 7 to 10 inches thick.

B_1 9 to 16 inches: reddish-yellow (7.5YR 6/6), gravelly, slightly gritty, heavy silt loam; moderate to strong, fine, subangular blocky structure; hard when dry, moderately firm when moist, and plastic and sticky when wet; roots fairly plentiful; many fine and medium pores; about 20 percent waterworn chert gravel; slightly acid; gradual to clear, smooth boundary; horizon is 4 to 9 inches thick.

B_2 16 to 33 inches: yellowish-red (5YR 5/6 to 5/8), gravelly, slightly gritty silty clay loam; strong, medium, blocky structure; very hard when dry, firm when moist, and plastic and sticky when wet; a few roots in upper part; many fine and a few medium pores; strong, self-colored clay skins on aggregate surfaces and in root channels; about 25 percent waterworn chert gravel; neutral; abrupt, smooth boundary; horizon is 12 to 20 inches thick.

C 33 to 42 inches +: yellowish-red (5YR 4/6) very gravelly coarse sandy clay; massive; slightly to moderately hard when dry, friable to firm when moist, and moderately plastic and sticky when wet; no roots; moderately slowly permeable; neutral to mildly alkaline.

The greatest variations in the Etowah soils in the county are in the content of gravel in the surface layer and subsoil and in the depth to the highly gravelly substratum. Some areas are practically free of gravel, particularly in the surface layer. Depth to the substratum is 24 to 40 inches or more, but most areas are at least 36 inches deep. The profile in some areas is slightly less red than the profile described; in other areas it is more red.

Etowah gravelly loam, 0 to 3 percent slopes (EtA).—There are 97 acres of this nearly level soil, all of them in use. Because the soil is well drained, nearly level, productive, and subject to practically no hazard, it is placed in capability unit I–1.

Etowah gravelly loam, 3 to 8 percent slopes, moderately eroded (EtB2).—This soil, which occupies 363 acres, is sloping and has been somewhat eroded. Because of the erosion hazard, the soil is placed in capability unit IIe–1.

Etowah gravelly loam, 8 to 15 percent slopes, moderately eroded (EtC2).—The slope of this soil is great enough so that it must be carefully managed and protected for full use. The 182 acres of this soil are in capability unit IIIe–1.

Etowah gravelly loam, 15 to 25 percent slopes, moderately eroded (EtD2).—This is the steepest of the Etowah soils. There are only 40 acres. In about 9 acres the profile is more silty and less gravelly than the one described. About 6 acres have slopes slightly more than 25 percent. All of these areas should be kept in sod most of the time, but an occasional cultivated crop in a long rotation may be produced. This soil is in capability unit IVe–1.

Etowah silt loam, 0 to 3 percent slopes (EwA).—This soil contains little gravel in the surface layer, and the surface layer is much more silty than that of the gravelly loams. This is an excellent soil, suited to all crops, and subject to no particular hazard. The 154 acres are in capability unit I–1.

Etowah silt loam, 3 to 8 percent slopes, moderately eroded (EwB2).—This soil has enough slope to be subject to some erosion. It is suitable for all crops grown in the area and is productive under good management. There are 339 acres, in capability unit IIe–1.

Etowah silt loam, 8 to 15 percent slopes, moderately eroded (EwC2).—The slope of this soil is great enough so that particularly good management is required for full use without damage. The 188 acres are in capability unit IIIe–1.

Fauquier Series

The Fauquier series consists of deep, well-drained, red soils that have been developed from materials weathered from a rock known as greenstone, or, more properly, metabasalt. The Fauquier soils occur in valleys and also on ridges and on low mountains of the Blue Ridge. They are the most prominent soils of the Pleasant Valley area between South Mountain and Elk Ridge. In the valleys they are closely associated with the Myersville soils, and on the mountains, with the Highfield soils. The soils of both the Myersville and Highfield series are similar to the Fauquier but are much less red. All of these soils have developed from the same parent rock.

The Fauquier soils are both extensive and important in Washington County. They are fertile and productive, more or less easily managed, and, except for the most stony areas, are intensively used for general crops, hay, pasture, and orchards.

Profile of Fauquier channery loam, 0 to 5 percent slopes, in a small wooded area three-tenths of a mile directly south of the public school at Rohrersville:

A_1 0 to 4 inches: dark reddish-brown (5YR 3/2), channery, heavy loam; moderate, coarse, crumb structure; moderately hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; slightly acid; clear, wavy boundary; horizon is 2 to 5 inches thick.

A_2 4 to 9 inches: yellowish-red (5YR 4/6), channery, heavy loam or light silt loam; moderate, medium, crumb structure; moderately hard when dry, friable when moist, and slightly plastic and sticky when wet; roots plentiful; abundant fine and medium pores; medium acid; clear to abrupt, wavy boundary; horizon is 3 to 6 inches thick.

B_{21} 9 to 20 inches: yellowish-red (5YR 5/6), channery, heavy silt loam; moderate, medium, subangular blocky structure; hard when dry, friable to firm when moist, and moderately plastic and moderately sticky when wet; roots fairly plentiful; many fine and medium pores; medium acid; gradual, wavy boundary; horizon is 8 to 15 inches thick.

B_{22} 20 to 41 inches: red (2.5YR 4/8) channery silty clay loam; very strong, medium, blocky and subangular blocky structure; very hard when dry, firm when moist, and plastic and sticky when wet; very few roots; many fine but few large pores; heavy, almost continuous, self-colored clay skins; strongly acid; gradual, wavy boundary; horizon is 15 to 30 inches thick.

B_{23} 41 to 50 inches: variegated yellowish-red, reddish-yellow, and brownish-yellow (5YR 5/8, 7.5YR 6/8, and 10YR 6/8) silty clay loam to silty clay; very strong, coarse, blocky and subangular blocky structure; hard when dry, firm when moist, and plastic and sticky when wet; practically no roots; many fine but few large pores; contains some stone fragments, mostly highly decomposed; almost continuous, self-colored clay skins and discontinuous, black films; slightly acid; clear, wavy boundary; horizon is 8 to 12 inches thick.

C_1 50 to 62 inches: very slightly variegated but essentially yellowish-red (5YR 4/8), decomposed metabasalt schist; inherited laminar structure; very hard when dry, firm or very firm when moist, and plastic and sticky when wet; no roots; a few heavy, red clay flows and some black films; medium to strongly acid; gradual, irregular boundary; horizon is 10 to 15 inches thick.

C_2 62 to 72 inches +: highly variegated red, reddish-brown, yellowish-brown, and olive-brown (2.5YR 4/6, 5YR 4/4, 10YR 5/6, and 2.5Y 4/4), partly decomposed metabasalt schist; very hard to extremely hard when dry, and very firm when moist or wet; medium acid.

The greatest variation in the Fauquier soils is in the amount and size of rock fragments. The silt loams have practically no fragments; the channery loams have many flat fragments as much as 6 inches in length; and the very stony loams, in some places, are ledgy and bouldery. A shallow phase of the silt loam, less than 24 inches deep to the substratum, is present in some places. Cultivated areas have brown surface soil where there has been little erosion, and red surface soil where erosion has been severe. Some of the stony and steep soils, particularly in the mountains, have somewhat less strongly developed horizons than those described.

Fauquier channery loam, 0 to 5 percent slopes (FaB).—This soil has the profile described. Although most areas have been cultivated, there is little erosion because of the low risk and general good management. This fairly easily managed, productive soil is in capability unit I–4. There are 244 acres.

Fauquier channery loam, 5 to 10 percent slopes, moderately eroded (FaB2).—This is an extensive soil that covers 1,735 acres. Slopes are great enough so that there has been active, but not severe, erosion in most places. The soil is suitable for all crops grown in the area and is in capability unit IIe–4.

Fauquier channery loam, 10 to 20 percent slopes, moderately eroded (FaC2).—This soil occupies 1,144 acres. Because of the slope, intensive good management is required to prevent erosion. The soil is in capability unit IIIe–4. Included, however, are 32 acres that have been rather severely eroded. These included areas, shown on the soil map, should be kept in sod or otherwise managed as if they were in capability unit VIe–2.

Fauquier channery loam, 20 to 35 percent slopes, moderately eroded (FaE2).—Here are 271 acres sufficiently steep so that their use for cultivated crops is strongly limited. Only about one cultivated crop in every 4 or 5 years should be grown, with the surface protected by sod most of the time. This soil is in capability unit IVe–3.

Fauquier silt loam, 0 to 3 percent slopes (FsA).—This soil, a silt loam, is like the soil described in the typical profile, except that the surface layer is somewhat finer in texture and there are few, if any, rock fragments. These more level areas, making up 41 acres, are in capability unit I–4.

Fauquier silt loam, 3 to 10 percent slopes, moderately eroded (FsB2).—This soil is sloping and somewhat eroded. It is an excellent soil, but it needs the management of capability unit IIe–4. There are 289 acres in the county.

Fauquier silt loam, 10 to 20 percent slopes, moderately eroded (FsC2).—This soil is strongly sloping, and erosion has been active. Because of this increased hazard, the soil is in capability unit IIIe–4. There are 93 acres, including 2 acres that have been severely eroded.

Fauquier silt loam, shallow, 3 to 20 percent slopes, moderately eroded (FtC2).—This soil is like the other Fauquier silt loams, except that the soil mantle is much thinner, with only about 18 to 24 inches above the substratum. Because of the shallowness of this soil, clean cultivation should be limited if the soil is to be kept productive. Hay crops, pastures, and orchards should be especially well suited on most areas. The 42 acres of this soil are in capability unit IVe–3.

Fauquier very stony loam, 5 to 35 percent slopes (FrE).—This soil contains stone fragments large enough and numerous enough to prevent practical cultivation. It occurs mostly on South Mountain and Elk Ridge. That part in forest should probably so remain and should produce excellent timber. Cleared areas are suitable for pasture if grazing is carefully controlled. The 435 acres of this soil are in capability unit VIs–2.

Frankstown Series

The Frankstown series consists of moderately deep, well-drained soils that have been developed in materials that weathered from impure limestone. The parent limestone contains much shale and chert and in some places thin seams of sandstone. The Frankstown soils are similar to the Duffield soils, but they are not so deep. They also contain many more residual fragments of chert and shale and in places residual fragments of limestone and sandstone. The Frankstown soils occupy ridgelike areas within the great limestone valley in the eastern part of the county.

Practically all areas have been cleared for agriculture, and no undisturbed forests remain. The Frankstown soils are fertile and productive, and, although they are somewhat shallower than the Duffield and the Hagerstown soils of the same areas, they are still among the best farming soils of the county.

Profile of Frankstown channery silt loam, 0 to 3 percent slopes, at a point in a cultivated area about 50 yards southwest of the intersection of U.S. Highway No. 40 with Beaver Creek Road:

A_p 0 to 8 inches: dark grayish-brown (10YR 4/2) channery silt loam; moderate, medium, crumb structure; friable when moist, sticky and slightly plastic when wet; roots abundant; some chert fragments and shale chips along with sandstone fragments; about 20 percent coarse fragments; medium acid; clear to abrupt, slightly wavy boundary; horizon is 6 to 8 inches thick.

B_{21} 8 to 18 inches: light yellowish-brown (10YR 6/4), channery, light silty clay loam; moderate to strong, medium, subangular blocky structure; somewhat firm when moist, plastic and sticky when wet; roots common; many fine and medium pores; about 15 percent stone fragments, with some shale and chert; strongly acid; gradual, wavy boundary; horizon is 8 to 12 inches thick.

B_{22} 18 to 29 inches: yellowish-brown (10YR 5/6) silty clay loam; strong, medium to coarse, blocky structure; firm when moist, plastic and sticky when wet; roots few; almost continuous, self-colored clay skins on aggregates and in pores; black films on some aggregates, becoming larger and more frequent with increasing depth; at least 25 percent coarse fragments, mostly shale but with some chert; medium acid; clear, strongly wavy to irregular boundary; horizon is 10 to 15 inches thick.

C 29 to 44 inches: about 90 percent greenish shale, with some chert fragments; infiltrated and coated with brown and yellowish-brown (7.5YR 5/4 and 10YR 5/4) silt or clay; some shale surfaces strongly etched by roots; medium acid; gradual, irregular boundary; horizon is 12 to 24 or more inches thick.

D_r 44 inches +: hard, cherty and shaly limestone.

Frankstown extremely rocky silt loam, 0 to 25 percent slopes (FuD).—This soil is so extremely rocky that, even though it has not been significantly eroded and slopes are not very great, it can serve no more useful purpose than very limited grazing. From about 40 to nearly 90 percent of the surface is occupied by ledges and massive outcrops. The most suitable use probably is for woodland. There are 983 acres, in capability unit VIIs–1.

Frankstown extremely rocky silt loam, 25 to 45 percent slopes (FuE).—The slopes of this soil are too great and there are too many rocks for crops or pasture. The soil can best be used for woodland. The 140 acres are in capability unit VIIs–1.

Frankstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded (FvC2).—This soil is neither steep nor severely eroded, but there are enough outcrops of limestone to make cultivation impractical. Up to about 40 percent of the surface is occupied by rock ledges. Hay might be grown in some places, but a more practical use would be for permanent pasture. There are 2,413 acres, in capability unit VIs–1.

Frankstown very rocky silt loam, 8 to 15 percent slopes, severely eroded (FvC3).—This soil has been so severely eroded that no hay crops should be attempted and grazing will have to be strictly limited. The 586 acres of this soil should be reforested. They are in capability unit VIIs–1.

Frankstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded (FvE2).—On this very rocky soil, erosion has not been severe but slopes are too great for any attempt at cultivation. Permanent pasture would be the most intensive suitable use for this soil. There are 519 acres, in capability unit VIs–1.

Frankstown and Duffield Soils

Except for the extremely rocky and very rocky soils, the Frankstown soils do not occur in areas large enough to be mapped separately from some of the soils of the Duffield series. In each of the following mapping units, most of the acreage is occupied by a phase of Frankstown channery silt loam. There are many places, how-

ever, where the soil is much deeper or thicker than is normal for Frankstown soils. These deeper areas are better classified as Duffield channery silt loam. Thus, at any place within one of the following mapping units, the soil may be either Frankstown or Duffield. Similar phases of the soils of both series have the same capability classification and other soil groupings and similar interpretations.

Frankstown and Duffield channery silt loams, 0 to 3 percent slopes (FwA).—The Duffield soil in this mapping unit contains more coarse rock fragments than the Duffield soils that are not mixed with Frankstown soils. These nearly level soils are not subject to any particular hazard if they are cultivated and well managed. They are in capability unit I–1. There are 244 acres.

Frankstown and Duffield channery silt loams, 3 to 8 percent slopes, moderately eroded (FwB2).—This is an extensive mapping unit that occupies 6,909 acres. The soils can be regularly cultivated if they are managed according to the requirements of capability unit IIe–1.

Frankstown and Duffield channery silt loams, 0 to 8 percent slopes, severely eroded (FwB3).—These severely eroded soils can be cropped safely if given the very careful management of capability unit IIIe–30, in spite of the damage by erosion that has already occurred. There are 60 acres.

Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, moderately eroded (FwC2).—Slopes of these soils are great enough so that particularly good management is required to prevent further erosion. The soils occupy 3,111 acres and are in capability unit IIIe–1.

Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, severely eroded (FwC3).—Erosion has been severe on these soils. There is enough soil remaining to support hay or pasture, however, with perhaps an occasional cultivated crop if the best protective measures are followed. The 1,366 acres are in capability unit IVe–1.

Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, moderately eroded (FwD2).—Although erosion has not been severe on these soils, slopes are so great that cultivation should be attempted only in very long rotations. The soils should be protected by a cover of sod most of the time. Hay can be grown safely, and this is an excellent soil for permanent pasture. There are 542 acres, in capability unit IVe–1.

Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, severely eroded (FwD3).—Erosion has been severe enough on these slopes so that further cultivation is too hazardous to be attempted. A more practical and safer use would be for pasture. The 864 acres are in capability unit VIe–1.

Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, moderately eroded (FwE2).—Erosion has not been severe on these soils, but the slope is too steep for safe cultivation. They will make good pasture, however, with the management of capability unit VIe–1. There are 162 acres.

Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, severely eroded (FwE3).—These steep, severely eroded soils are unsuitable for cultivation, and most areas are unsuitable even for grazing. A much better use is for woodland. The 89 acres are in capability unit VIIe–1.

Frederick Series

The Frederick series consists of deep, well-drained, red soils on ridges of impure, cherty limestone. The Frederick soils are redder than the Duffield and the Frankstown soils, and redder and finer textured than the Elliber soils. Their subsoil is not so fine textured as that of the Dunmore and Hagerstown soils.

The Frederick soils occur in Washington County only on ridges within the ridge and valley section to the west of Fairview Mountain. They are fairly extensive. Where cleared, they are used for general crops, pasture, and orchards, but a considerable proportion is still in forest because of the rugged topography.

Profile of Frederick cherty silt loam, 0 to 8 percent slopes, moderately eroded, in a forested area 50 yards south of U.S. Highway 40, eight-tenths of a mile east of the intersection with Indian Springs Road:

A_1 0 to 2 inches: black (10YR 2/1) cherty silt loam; weak, medium, crumb structure; soft when dry, very friable when moist, and slightly plastic and slightly sticky when wet; roots matted; about 20 percent angular chert gravel; slightly acid; abrupt, wavy boundary; horizon is 2 to 4 inches thick.

A_2 2 to 7 inches: dark-gray (10YR 4/1), cherty, light silt loam; weak, fine, crumb structure; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; roots abundant; many fine and medium pores and some large pores; about 25 percent chert gravel; medium acid; clear to abrupt, wavy boundary; horizon is 3 to 7 inches thick.

B_1 7 to 12 inches: reddish-yellow (7.5YR 7/8), cherty, heavy silt loam; weak to moderate, fine, subangular blocky structure; moderately hard when dry, friable to slightly firm when moist, and moderately plastic and moderately sticky when wet; roots plentiful; many fine and medium pores; about 15 percent chert gravel; strongly acid; gradual, wavy boundary; horizon is 4 to 8 inches thick.

B_{21} 12 to 25 inches: reddish-yellow (5YR 6/8), cherty, light silty clay loam; moderate, medium, blocky and subangular blocky structure; hard when dry, rather firm when moist, and plastic and sticky when wet; roots fairly thick; continuous, self-colored clay skins; about 15 percent chert gravel; very strongly acid; gradual, wavy boundary; horizon is 10 to 17 inches thick.

B_{22} 25 to 41 inches: yellowish-red (5YR 5/8) silty clay loam; very strong, fine to medium, blocky structure; hard or very hard when dry, firm when moist, and plastic and sticky when wet; a few large, woody roots; strong, almost continuous, self-colored clay skins and many black films; many fine and medium pores; almost free of gravel; very strongly to extremely acid; gradual, wavy to irregular boundary; horizon is 12 to 25 inches thick.

C 41 to 48 inches +: variegated red and yellowish-red (2.5YR 4/8 and 5YR 5/8) cherty clay loam to light clay; very weak, medium to coarse, blocky structure; hard when dry, firm when moist, and sticky and very plastic when wet; a very few woody roots; moderately slowly permeable; a few thin, red clay flows and some black films; neutral.

In some places the profile is more cherty and less deep than the profile described. In cultivated areas the surface soil is less gray and more brownish or reddish than that in the profile described. The Frederick soils are naturally somewhat less productive than the Duffield, Dun-

more, and Frankstown soils. In Washington County they are less used for agriculture.

Frederick cherty silt loam, 0 to 8 percent slopes, moderately eroded (FyB2).—This soil has the profile described and the mildest slopes of any soil of the Frederick series in the county. Erosion has been fairly active in many places, but it has not been severe. This soil is suited to all crops, but, because of the hazard of erosion, it is in capability unit IIe–26. There are 711 acres.

Frederick cherty silt loam, 8 to 15 percent slopes, moderately eroded (FyC2).—Erosion has not been severe on this soil, but, because of the danger of erosion on the slopes, the soil is in capability unit IIIe–26. There are 672 acres.

Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded (FyC3).—This soil has been so severely eroded that it is suitable for only an occasional clean-tilled crop. The surface must be protected, as by sod, most of the time. Pasture, hay crops, and sodded orchard are suitable uses. There are 63 acres, in capability unit IVe–26.

Frederick cherty silt loam, 15 to 25 percent slopes, moderately eroded (FyD2).—This soil has been only moderately eroded, and it is in capability unit IVe–26. There are 517 acres. The soil is excellent for orchards.

Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded (FyD3).—Erosion has taken so much of this soil that cultivation is no longer safe. The soil would be a good one for permanent pasture, however, or perhaps for sodded and carefully managed orchards. This soil occupies 57 acres and is in capability unit VIe–1.

Frederick cherty silt loam, 25 to 45 percent slopes, moderately eroded (FyE2).—Erosion has not been very active on this soil, mostly because many of the areas are still in forest. Any cultivation would be very hazardous, and permanent pasture would be a more practical and safer use. There are 465 acres, in capability unit VIe–1.

Hagerstown Series

The Hagerstown series consists of deep, well-drained, reddish soils that have been developed in materials weathered from hard, fairly pure limestone. The Hagerstown soils in some places contain scattered to very numerous outcropping ledges of limestone. These soils are used for all crops, but, where there is much surface rock, cultivation is hindered and the usefulness of the soils may be somewhat to very strongly limited.

Soils of the Hagerstown series are the most extensive and important in the county. They are important in the highly developed agriculture of the limestone areas. The Hagerstown soils are associated with many other soils, but most notably with those of the Benevola, Corydon, Duffield, and Frankstown series.

Profile of Hagerstown silt loam in a forested area 1 mile north of Keedysville on State Road No. 34:

A_1 0 to 3 inches: dark-brown (7.5YR 3/2) silt loam; moderate, fine to medium, granular structure; very friable when moist, moderately plastic and moderately sticky when wet; roots abundant; neutral; clear to abrupt boundary.

A_2 3 to 8 inches: brown (7.5YR 4/4) silt loam; moderate, fine to medium, subangular blocky structure; blocks crush when moist to moderate, fine granules; friable when moist, moderately plastic and moderately sticky when wet; roots abundant; strongly acid; clear to abrupt, smooth to slightly wavy boundary.

B_1 8 to 17 inches: yellowish-red (5YR 4/6), heavy silt loam or light silty clay loam; moderate, medium, subangular blocky structure; friable or firm when moist, plastic and sticky when wet; roots plentiful; medium acid; clear, smooth boundary.

B_{21} 17 to 29 inches: reddish-brown (2.5YR 4/4) silty clay loam; strong, medium to coarse, subangular blocky structure; very hard when dry, firm when moist, and plastic and sticky when wet; roots rather plentiful; common, faint, reddish-brown clay skins and common black films on aggregates; medium acid; gradual, smooth to wavy boundary.

B_{22} 29 to 39 inches: red (2.5YR 4/6) silty clay; strong, medium to coarse, blocky structure; very hard when dry, firm when moist, plastic and sticky when wet; roots rather few; faint to distinct, almost continuous, red clay skins and common black films on aggregates; contains some fragments of weathered limestone; medium to slightly acid; gradual to diffuse, irregular boundary.

B_3 39 to 49 inches: yellowish-red (5YR 4/6) silty clay loam or light silty clay; moderate to strong, fine to coarse, blocky and subangular blocky structure; very hard when dry, firm when moist, and plastic and sticky when wet; very few roots; distinct to prominent clay skins and common black films on aggregates; contains some fragments of weathered limestone; medium acid; gradual to diffuse, irregular boundary.

C 49 to 74 inches +: yellowish-red (5YR 4/8) silty clay loam; very weak, medium, blocky and subangular blocky structure; hard when dry, firm when moist, and plastic and sticky when wet; few to common small, black films, but no visible clay skins; medium acid.

In rocky areas the depth of the soil may range from very shallow to very deep. The uneroded soil in woodland is almost everywhere a silt loam at the surface, but areas that are, or have been, cultivated may have a surface soil of silty clay loam or clay loam. In large, freshly cultivated or plowed fields, the eroded areas stand out because of the redder color of the surface that is exposed by turning up some subsoil.

Some very rocky and extremely rocky areas appear to be much like the Corydon very rocky clay loams and the Corydon extremely rocky clay loams, but the soil between the rock outcrops is redder and much deeper, on the average, than that in soils of the Corydon series. Where there is much impurity in the parent rock, the Hagerstown soils grade toward the Duffield or Frankstown soils in characteristics.

Hagerstown clay loam, 0 to 3 percent slopes (HaA).—This soil has a profile like the one described, except that the surface layer is clay loam instead of silt loam. The clay loam texture is probably a result of past erosion. If so, however, the previous erosion cycle has been stabilized, and a fairly thick surface soil has developed that shows little evidence of recent erosion.

This nearly level Hagerstown clay loam is suited to any crop of the region and is rather easily protected from erosion. It is somewhat difficult to cultivate and manage because of the fine-textured surface layer, which is more plastic and more sticky than that of the soil described as representative of the series. The 117 acres of this soil are, therefore, in capability unit IIs–1.

599553—62——3

Hagerstown clay loam, 0 to 8 percent slopes, moderately eroded (HaB2).—This sloping soil shows some evidence of erosion. Because of the risk of further erosion plus the difficulty of managing a fine-textured soil, the 775 acres are in capability unit IIe–19.

Hagerstown clay loam, 3 to 8 percent slopes, severely eroded (HaB3).—The gentle slopes of this Hagerstown clay loam have been so severely eroded that further cultivation is hazardous, except under very careful management, and management is difficult. There are 52 acres, in capability unit IIIe–30.

Hagerstown clay loam, 8 to 15 percent slopes, moderately eroded (HaC2).—This Hagerstown soil has slopes great enough so that cultivation is hazardous unless careful management is practiced, as suggested for capability unit IIIe–30. There are 144 acres.

Hagerstown clay loam, 8 to 15 percent slopes, severely eroded (HaC3).—This sloping, severely eroded Hagerstown clay loam can be farmed in very long rotations if the cover is sod much of the time. There are 153 acres in capability unit IVe–1.

Hagerstown clay loam, 15 to 25 percent slopes, moderately eroded (HaD2).—The slope makes this soil somewhat limited in usefulness. The 123 acres are in capability unit IVe–1.

Hagerstown clay loam, 15 to 25 percent slopes, severely eroded (HaD3).—This strongly sloping, severely eroded soil is not suitable for cultivation. The 190 acres are more useful as permanent pasture. The soil is in capability unit VIe–1.

Hagerstown extremely rocky silt loam, 0 to 25 percent slopes, moderately eroded (HbD2).—The profile of this soil is like that of the silt loam described as representative of the series, except that it is extremely rocky; from about 40 to nearly 90 percent of the surface of the soil is occupied by limestone outcrops. Although this is a good soil, the rocks prevent or severely obstruct almost any kind of management, except possibly the treatment of very small areas by hand. Although real pasture improvement is almost impossible, this soil can be used for some limited grazing; probably a better use is for woodlots. There are 6,696 acres in capability unit VIIs–1.

Hagerstown extremely rocky silty clay loam, 0 to 25 percent slopes, moderately eroded (HcD2).—This soil is like the one described in the preceding paragraph, except that the surface layer is finer in texture. It can be used and managed in the same way. The 4,156 acres are in capability unit VIIs–1.

Hagerstown extremely rocky soils, 25 to 45 percent slopes (HdE).—These soils are steep and extremely rocky. They are not suitable for crops or for improved pasture, but they would make excellent woodlots or furnish some very limited grazing. There are 111 acres, in capability unit VIIs–1.

Hagerstown silt loam, 0 to 3 percent slopes (HeA).—This soil has the profile that is described in detail as representative of the Hagerstown series. It is nearly level and has been affected only slightly or not at all by erosion. The lack of erosion is either because the soil remained in woodland cover or because, more commonly, it was very well managed in farming. There is no better soil in the county for most purposes. It can be cultivated safely with ordinary, good farming methods, is highly productive under good management, and is suited to all the crops of the region. The 1,146 acres of this excellent soil are in capability unit I–1.

Hagerstown silt loam, 0 to 8 percent slopes, moderately eroded (HeB2).—This is the most extensive soil in Washington County and one of the better ones. Because it has been long in use, erosion has become active but not dangerously severe. Although this soil can be used for all the common crops, it should be cultivated only with the good management that is necessary to prevent further damage by erosion. This soil occupies 22,661 acres and is in capability unit IIe–1.

Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded (HeC2).—This sloping soil needs careful management, with long rotations that include hay or pasture, to prevent damaging erosion. The 3,690 acres are in capability unit IIIe–1.

Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded (HeD2).—The slope of this soil is too steep for regular cultivation. The soil should be kept under sod most of the time. It is excellent for hay and pasture. The 252 acres are in capability unit IVe–1.

Hagerstown silty clay loam, 0 to 3 percent slopes (HfA).—This soil is similar to Hagerstown silt loam, 0 to 3 percent slopes, except that the surface soil contains less silt and more clay, making it heavier and somewhat more difficult to manage. It is well suited to all the crops grown locally and can be cultivated with little danger of damage. The 437 acres are in capability unit I–1.

Hagerstown silty clay loam, 0 to 8 percent slopes, moderately eroded (HfB2).—Because of slope and the risk of further erosion, this soil must be managed with some care. It should be used and treated as discussed under capability unit IIe–1. There are 4,038 acres of this excellent soil in the county.

Hagerstown silty clay loam, 8 to 15 percent slopes, moderately eroded (HfC2).—On this sloping soil very careful management is necessary for cultivated crops if soil damage is to be avoided. This is an excellent soil, however, and it is highly productive under good management. There are 1,458 acres, in capability unit IIIe–1.

Hagerstown silty clay loam, 15 to 25 percent slopes, moderately eroded (HfD2).—The slopes of this soil are critical, and cultivated crops should be limited to 1 year in 4 or 5, with a sod crop on the land most of the time. The 153 acres are in capability unit IVe–1.

Hagerstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded (HgC2).—This soil has a profile much like the one described as representative of the series. As much as about 40 percent of the surface layer consists of outcropping ledges and reefs of hard limestone. Although this soil has fewer outcrops than the Hagerstown extremely rocky silt loam, there are too many outcrops for any regular cultivation. Because of the slope, there is a definite erosion hazard. For that reason, grazing, the most intensive suitable use, must be limited and carefully managed. The rockiness is the chief limitation, and so the 10,613 acres of this soil are in capability unit VIs–1.

Hagerstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded (HgE2).—Because erosion has done little damage, this steep soil is suitable for pasture

if it is carefully managed and grazing is limited. The 1,087 acres are in capability unit VIs–1.

Hagerstown very rocky silty clay loam, 3 to 15 percent slopes, moderately eroded (HhC2).—This extensive and excellent soil makes very good permanent pasture, although it is too rocky for normal cultivation. There are 8,371 acres, in capability unit VIs–1.

Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded (HhC3).—Erosion has been so active on this very rocky soil that its usefulness, even for pasture, has largely been destroyed. The soil can furnish some very limited grazing, but its best use would be for woodland. There are 2,836 acres, in capability unit VIIs–1.

Hagerstown very rocky silty clay loam, 15 to 45 percent slopes, moderately eroded (HhE2).—The slopes of this very rocky soil are too great for any more intensive use than pasture. Good grazing can be maintained with proper management. The 621 acres are in capability unit VIs–1.

Hagerstown very rocky soils, 45 to 55 percent slopes (HkF).—These are the steepest very rocky soils of the Hagerstown series. There has been little, if any, erosion because most areas have remained in woodland with little or no disturbance. This group of soils should remain in forest. There are 107 acres, in capability unit VIIs–1.

Hagerstown, Corydon, and Duffield very rocky silt loams, 0 to 3 percent slopes (HlA).—This mapping unit consists of very rocky soils of the three series named, wherever they occur in nearly level positions. Rockiness prevents cultivation, but it also may help check erosion, and none of these areas have been appreciably eroded. These are excellent soils for pasture or woodland, and, wherever they are kept in permanent vegetation, they should not deteriorate in any way. There are 424 acres, in capability unit Vs–1.

Hagerstown and Duffield silt loams, 25 to 45 percent slopes, moderately eroded (HmE2).—This mapping unit contains silt loams of both the Hagerstown and Duffield series. The soils are so steep that they should not be cultivated. There are 149 acres in capability unit VIe–1.

Hazel Series

The Hazel series consists of very shallow, skeletal soils on hard, slaty or phyllitic quartzite. The soils occur only on excessively drained, rolling to steep uplands, mostly in the area west of Elk Ridge and just north of Harpers Ferry. They are associated with soils of the Chandler series, but they are much shallower than those soils and have only very slight horizonation that is the result of soil-forming processes.

Though the Hazel soils are thin and droughty, some of the more nearly level areas can be used for crops. There is little farming, however, on these soils. The steeper areas are mostly in forest.

Profile of Hazel channery silt loam, 0 to 10 percent slopes, moderately eroded, in a forested area just west of Harpers Ferry Road, 1 mile south of its intersection with Hoffmaster Road:

A_1 0 to 1 inch: black (10YR 2/1) channery silt loam; moderate, medium, crumb structure; soft to very slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; roots abundant; 10 to 30 percent slaty fragments of phyllite; slightly acid; clear to abrupt, wavy boundary; horizon is ½ inch to 1½ inches thick

C_1 1 to 7 inches: brownish-yellow (10YR 6/6), very channery, light silt loam; weak to moderate, fine, subangular blocky structure; slightly hard when dry, very friable when moist, slightly plastic and moderately sticky when wet; roots fairly plentiful; 40 to 50 percent phyllite fragments; this layer is only partially developed toward a true B horizon; slightly acid; gradual, irregular boundary; horizon is 4 to 10 inches thick.

C_2 7 to 24 inches: light yellowish-brown (10YR 6/4) mass of partially decomposed to hard phyllite fragments; inherited laminar structure; slightly hard when dry, friable to firm when moist, with fine material moderately plastic and moderately sticky when wet; a few woody roots; 80 to 90 percent stone fragments, and 10 to 20 percent fine material; strongly acid; abrupt, irregular to broken boundary; horizon is 10 to 20 inches thick.

D_r 24 inches +: hard, gray, greenish-gray, and yellowish-gray phyllite.

There may be fine mica particles throughout the profile. In some places there is a very thin layer, resembling a true subsoil, between the A_1 and C_1 horizons. There are occasional stones, boulders, and outcropping ledges of phyllite. In many places the soil blends with the somewhat deeper and better developed soils of the Chandler series.

Hazel channery silt loam, 0 to 10 percent slopes, moderately eroded (HnB2).—This soil has the profile described. It includes the better areas of Hazel channery silt loam. Slope is gentle and erosion has been moderate, but, because of its droughty nature, the soil is severely limited in use. Some crops may be grown or pastures developed, but they will be affected by drought in dry weather. The 1,438 acres are in capability unit IIIs–2.

Hazel channery silt loam, 10 to 20 percent slopes, moderately eroded (HnC2).—This soil is steep enough so that the hazard of erosion is of more significance than the droughtiness. Erosion has not yet been severe, because most of the areas remain in forest. If cleared, the soil could be cultivated safely only with great care, in very long rotations with sod crops. There are 1,856 acres, in capability unit IVe–32.

Hazel channery silt loam, 10 to 20 percent slopes, severely eroded (HnC3).—This soil is so thin and erosion has been so severe that continued cropping would be hazardous. The soil might be suitable for orchards if well managed and protected, particularly if water for irrigation were available. Otherwise, it is best suited to forests or to limited grazing. The 202 acres are in capability unit VIe–3.

Hazel channery silt loam, 20 to 30 percent slopes, moderately eroded (HnD2).—Slope and shallowness strongly limit the usefulness of this soil. The soil might be used for very limited grazing, or possibly for well-sodded and well-managed orchards; otherwise, it should remain in forests. It occupies 1,095 acres and is in capability unit VIe–3.

Hazel channery silt loam, 20 to 30 percent slopes, severely eroded (HnD3).—There are 124 acres of this soil. The areas are so steep and so severely eroded that they should not be used for crops or for grazing, but for

woodland and wildlife. The soil is in capability unit VIIe–3.

Hazel channery silt loam, 30 to 45 percent slopes (HnE).—The slopes of this thin, droughty soil are so great that neither cultivation nor pasture should be attempted. The soil is almost entirely in woodland and should remain so. There are 210 acres, in capability unit VIIe–3.

Highfield Series

The Highfield series consists of deep, well-drained soils that were developed from the same materials as soils of the Fauquier and the Myersville series. These materials are the weathered products of metabasalt, a rock locally known as greenstone. The Highfield soils occur on mountains and on high intermountain or valley slopes. They are yellowish brown to brown and differ from the Myersville soils of the valleys in being much less well developed and somewhat weaker in color. They are not so red as the Fauquier soils.

Most areas of the Highfield soils are stony and are chiefly in forest. Nonstony areas can be used for crops because they are closely associated with more stony soils; however, many of these areas are still in forest. The Highfield soils are fairly extensive, chiefly on South Mountain and Elk Ridge.

Profile of Highfield very stony loam, 0 to 5 percent slopes, in a forested area 100 yards off Ritchie Road, 2¾ miles southwest of Fort Ritchie:

A_1 0 to 3 inches: very dark gray (10YR 3/1), very stony, heavy loam; moderate, fine, crumb structure; soft when dry, loose or very friable when moist, slightly plastic and very slightly sticky when wet; roots abundant; strongly acid; abrupt, wavy boundary; horizon is 1 to 3 inches thick.

A_2 3 to 8 inches: yellowish-brown (10YR 5/4), very stony, heavy loam; weak, coarse, granular structure; slightly hard when dry, friable when moist, and moderately plastic and slightly sticky when wet; roots plentiful; many pores, mostly fine and medium; contains some fragments and small chips of metabasalt or greenstone; strongly acid; clear to abrupt, wavy boundary; horizon is 4 to 7 inches thick.

B_1 8 to 20 inches: dark yellowish-brown (10YR 4/4), very stony silt loam; moderate, medium, subangular blocky structure; slightly hard when dry, friable when moist, and moderately plastic and moderately sticky when wet; many woody but few fibrous roots; many fine and medium pores; some greenstone fragments; strongly acid; gradual, wavy to irregular boundary; horizon is 10 to 17 inches thick.

B_2 20 to 36 inches: strong-brown (7.5YR 5/6), very stony, light silty clay loam; moderate to strong, medium, subangular blocky structure; moderately hard when dry, somewhat firm when moist, and plastic and moderately sticky when wet; very few roots; some medium and many fine pores; discontinuous, self-colored clay skins; some greenstone fragments; very strongly acid; gradual, irregular boundary; horizon is 12 to 20 inches thick.

C 36 to 52 inches: yellowish-brown (10YR 5/8) very stony loam; inherited weak, coarse, laminar structure; hard when dry, moderately firm when moist, and moderately plastic and slightly sticky when wet; no visible roots; 60 to 80 percent partially decomposed to hard fragments and stones; strongly acid; abrupt, irregular to broken boundary; horizon is 10 to 30 inches thick.

D_r 52 inches+; bedrock of massive to platy metabasalt with many white quartzite impurities.

In some places the upper subsoil is more brown (less yellow) than that described in the typical profile. Most areas are very stony, and outcrops and ledges are fairly common. Because of the dominant stoniness, the profile of this soil may be either shallower or deeper than the profile described.

Highfield gravelly loam, 0 to 5 percent slopes (HoB).—This soil has a profile like the one described, except that there are only occasional stones on or in the soil. In places there are small fragments of greenstone and many angular fragments of white quartzite gravel that was an impurity in the parent rock. This soil makes up the more useful areas of the Highfield series. Because of gentle slope and freedom from erosion, the soil is in capability unit I–4. There are 67 acres.

Highfield gravelly loam, 5 to 10 percent slopes, moderately eroded (HoB2).—There has been active erosion on most areas of this sloping soil but serious damage in only a few places. There are 315 acres, in capability unit IIe–4; the more severely eroded areas should be treated like the soils in capability unit IIIe–4.

Highfield gravelly loam, 10 to 20 percent slopes, moderately eroded (HoC2).—Although erosion has not been severe on this soil, the slopes are such that the hazard of erosion is great. The soil is in capability unit IIIe–4. There are 212 acres.

Highfield gravelly loam, 20 to 35 percent slopes, moderately eroded (HoE2).—This soil is so strongly sloping that cultivation must be limited to only occasional tilled crops, sod crops such as hay, or sodded orchards. The 78 acres are in capability unit IVe–3.

Highfield very stony loam, 0 to 5 percent slopes (HpB).—This soil has the profile described as representative of the series. It is so stony that cultivation should not be attempted. The soil makes excellent pastureland, however, and woodland management should be economically feasible and not especially difficult. There are 44 acres. The soil is in capability unit Vs–2.

Highfield very stony loam, 5 to 30 percent slopes (HpD).—This soil is strongly sloping, but it is suitable for pasture if the grazing is limited and well managed. Timber operations will be more difficult but should be economically feasible. There are 2,123 acres. The soil is in capability unit VIs–2.

Highfield very stony loam, 30 to 45 percent slopes (HpE).—This soil is so stony and steep that it should be kept in forest. Timber operations will be difficult, but woodland is the best use. The soil is in capability unit VIIs–2. It occupies 470 acres.

Holston Series

The Holston series consists of deep, well-drained, acid, brown soils on very old river terraces. The materials in which the Holston soils have been developed are old alluvial deposits, which were brought by streams from areas of acid sandstone and shale. The Holston soils are on terraces of the Potomac River, mostly between Four Locks and Millstone. They are on the same terraces as the red, well drained Waynesboro soils, and also the brown, moderately well drained Monongahela soils, which contain a siltpan.

The Holston soils are fairly extensive. Some areas are still in forest, but most areas have been cleared and are used for general crops or pasture.

Profile of Holston silt loam, 0 to 3 percent slopes, in a forested area just off Garrison Hollow Road, about eight-tenths of a mile south of its intersection with State Road No. 56:

- A_1 0 to 2 inches: very dark grayish-brown (10YR 3/2), light silt loam; moderate, fine, crumb structure; soft to slightly hard when dry, very friable when moist, and slightly plastic but nonsticky when wet; roots abundant; strongly acid; abrupt, wavy boundary; horizon is 1 to 3 inches thick.
- A_2 2 to 9 inches: dark yellowish-brown (10YR 4/4) silt loam; moderate, fine, crumb structure; slightly to moderately hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots plentiful; many fine and medium and some large pores; very strongly acid; abrupt, wavy boundary; horizon is 4 to 8 inches thick.
- B_1 9 to 15 inches: yellowish-brown (10YR 5/6) fine gravelly silt loam; weak, fine, subangular blocky structure; moderately hard when dry, friable when moist, and moderately plastic and moderately sticky when wet; roots rather few; many fine and medium pores; strongly acid; diffuse boundary; horizon is 4 to 7 inches thick.
- B_{21} 15 to 24 inches: brownish-yellow (10YR 6/6), gravelly, heavy silt loam; moderate, medium, subangular blocky structure; moderately hard when dry, friable to moderately firm when moist, and moderately plastic and moderately sticky when wet; roots few; many fine and common medium pores; strongly acid; diffuse boundary; horizon is 8 to 12 inches thick.
- B_{22} 24 to 37 inches: brownish-yellow (10YR 6/6), gravelly, silty clay loam; strong, medium, blocky and subangular blocky structure; hard when dry, firm when moist, and plastic and sticky when wet; very few roots; nearly continuous, self-colored clay skins on aggregates and in pores; very strongly acid; clear, wavy boundary; horizon is 10 to 20 inches thick.
- C 37 to 42 inches +: variegated yellowish-brown and yellow (10YR 5/6 and 7/6), very gravelly, light sandy clay loam; weakly stratified; hard when dry, firm when moist, and plastic and sticky when wet; a very few roots in upper portion; a very few brownish-yellow (10YR 6/6) clay flows; extremely acid.

In some places the surface layer and subsoil are gravelly; the substratum is gravelly everywhere. The surface layer may be sandy loam, loam, or silt loam. In some places the lower subsoil, just above the substratum, may be slightly mottled and weakly platy in structure.

Holston gravelly loam, 0 to 3 percent slopes (HrA).—This soil has a profile like the one described, except that the surface layer is less silty and much more gravelly. This is a good soil, suitable for nearly all crops, and not subject to any particular hazard. The 439 acres are in capability unit I–4.

Holston gravelly loam, 0 to 8 percent slopes, moderately eroded (HrB2).—This soil occupies 1,395 acres. In some areas the surface layer is gravelly silt loam. Because of the risk of erosion, the soil is in capability unit IIe–4.

Holston gravelly loam, 8 to 15 percent slopes, moderately eroded (HrC2).—There are 588 acres of this sloping, moderately eroded soil. The soil can be cultivated safely with the good management practices applicable to its capability unit IIIe–4.

Holston gravelly loam, 15 to 25 percent slopes, moderately eroded (HrD2).—This soil includes small areas of silt loam and of gravelly sandy loam, too small to be mapped as different soils. Cultivation must be strongly limited and the soil very carefully managed. The 118 acres of this soil are in capability unit IVe–3.

Holston gravelly loam, 8 to 25 percent slopes, severely eroded (HrD3).—These areas, making up 49 acres, are too severely eroded for further cultivation. After establishing sod, however, they will produce good permanent pasture or an occasional hay crop. The soil is in capability unit VIe–2.

Holston gravelly loam, 25 to 45 percent slopes, moderately eroded (HrE2).—There are 70 acres of this soil, which is too steep to be cultivated safely. The soil can be used for grazing, for occasional hay crops, or for woodland. It is in capability unit VIe–2.

Holston gravelly sandy loam, 3 to 8 percent slopes (HsB).—The profile of this soil differs somewhat from the one that was described as representative of the series. The surface layer is sandy loam, and the soil contains a fairly large amount of waterworn gravel. The sand and gravel make the soil somewhat droughty and, hence, low in productivity. The 115 acres of this soil are in capability unit IIs–2.

Holston gravelly sandy loam, 3 to 15 percent slopes, moderately eroded (HsC2).—On these slopes control of erosion is a more important management problem than sandiness of the soil. This soil occupies 153 acres. It is in capability unit IIIe–5.

Holston gravelly sandy loam, 8 to 15 percent slopes, severely eroded (HsC3).—This soil has been so severely eroded that its use for crops is strongly limited. Very careful conservation measures are required for safe cultivation. The soil occupies 50 acres. It is in capability unit IVe–5.

Holston silt loam, 0 to 3 percent slopes (HtA).—The profile of this soil is the one described in detail for the Holston series. It is a very good soil, subject to very little hazard of any kind if well managed. The 224 acres are in capability unit I–4.

Holston silt loam, 3 to 8 percent slopes, moderately eroded (HtB2).—The slope of this soil and the erosion that has occurred make simple conservation measures necessary for continued cultivation. This soil occupies 666 acres. It is in capability unit IIe–4.

Holston silt loam, 8 to 15 percent slopes, moderately eroded (HtC2).—These 208 acres on strong slopes must be carefully managed for safe use and production. The soil is in capability unit IIIe–4.

Huntington Series

The Huntington series consists of deep, well-drained soils on flood plains along rivers and streams. The soils are composed of fine materials washed originally from areas in which the soils were derived from or strongly influenced by limestone. Except for some modification of the surface layer by organic matter, these soils show practically no development of horizons; hence, they have a uniform or a stratified profile and no B horizon. The Huntington soils are associated on the flood plains chiefly with the moderately well drained Lindside soils and the poorly drained and very poorly drained Melvin and Dunning soils.

The Huntington soils are excellent for most kinds of farming. Although they originated by overflow and overwashing, they are not subject to very frequent or very prolonged flooding. They are used for most crops.

Profile of a Huntington silt loam in a cultivated area on the flood plain of Antietam Creek, one-fourth mile northwest of Leitersburg:

A_p 0 to 7 inches: dark grayish-brown (10YR 4/2) silt loam; moderate, coarse, crumb structure; moderately hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; many worm channels; neutral; clear, smooth boundary as a result of plowing; horizon is 6 to 8 inches thick.

C_1 7 to 38 inches: dark-brown (7.5YR 4/4) silt loam; compound, very weak, medium, platy and moderate, fine, granular structure; hard when dry, friable to somewhat firm when moist, and moderately plastic and slightly sticky when wet; roots plentiful in upper part; many fine and medium pores and some worm channels; neutral; very gradual, smooth boundary; horizon is 30 to 40 inches thick.

C_2 38 to 48 inches +: brown to dark-brown (7.5YR 4/2), slightly gritty silt loam; common, fine specks of dark gray and strong brown; weak, coarse, platy structure; hard when dry, firm and somewhat brittle when moist, and moderately plastic and moderately sticky when wet; a very few roots; neutral; grades with depth to stratified materials that are generally gravelly or sandy, or both.

Waterworn gravel fragments may be present in any part of the profile, but in the nongravelly soils they are confined mostly to the lower substratum. Depth to the C_2 horizon varies considerably and may be several feet in some places. Color, especially of the surface layer, varies somewhat; in some places it is brown or slightly reddish brown.

Huntington fine sandy loam (Hu).—This soil is like Huntington silt loam, except that the entire profile, and particularly the surface layer, contains less silt and clay and much more fine sand. This is an excellent soil, and it is suited to all the common crops. A few acres, which could not be separated on the map, may be occasionally or frequently damaged by flooding. The cropping system there should be adjusted to the flood hazard. Most slopes are less than 3 percent, but in a few places the slope is as great as 8 percent. The 1,507 acres of this soil are in capability unit I–6.

Huntington gravelly loam (Hv).—This soil is like Huntington silt loam, except that the surface layer is less silty and the entire profile contains considerable waterworn gravel. This is an excellent soil, suitable for all of the common crops. If flooding is a problem on any area, the management of this land should be adjusted accordingly. Most areas are nearly level, but some slopes are as great as 8 percent. The 671 acres of this soil are in capability unit I–6.

Huntington silt loam (Hw).—This soil has the profile that was described as representative of the series. It is an excellent soil, and normally has practically no hazard to limit its cultivation. It is used for all crops of the area, and is especially desirable for corn. A few areas, which could not be separated on the map, may be occasionally or frequently affected by high water. Practically all areas are nearly level. The 1,439 acres of this soil are in capability unit I–6.

Huntington silt loam, local alluvium (Hx).—This soil resembles Huntington silt loam, except that it does not lie on true flood plains. It occupies slight depressions in areas of soils underlain by limestone, and lies also around drainage heads and on some foot slopes within the same areas. It has been formed by the deposit of fine material that was washed directly down from surrounding upland soils, and not by settlement out of floodwaters, as with the Huntington soils of the flood plains. In some places the substratum is slightly finer in texture than the surface layer, showing the beginnings of profile development, but this is exceptional.

The soil is extensive and important, although generally in small areas. There are 4,811 acres, most of which are nearly level or only very gently sloping. Some slopes, however, are as great as 8 percent. This highly productive soil is used for all purposes and is in capability unit I–6.

Laidig Series

The Laidig series consists of deep, well-drained, acid soils that were developed on old rockslides or other colluvial deposits of sandstone, quartzite, and occasionally some shale. The Laidig soils are characterized by a deep and very thick, platy fragipan in the lower subsoil. The fragipan layer, however, apparently does not restrict drainage of the soil.

It has been noted under the Edgemont series that the Edgemont and Laidig soils are in many places very closely associated and were mapped together in undifferentiated units. The Laidig soils were also mapped by themselves.

Like the Edgemont soils, the Laidig soils are not highly productive, but they are suited to most crops and are used for orchards and berry crops.

Profile of Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded, in a forest just off Woodmont Road, high on the slopes of Tonoloway Ridge between Woodmont and Cohill:

A_{11} 0 to 1½ inches: black (N 2/0), gravelly, light loam; weak, very fine, granular structure; soft when dry, loose or very friable when moist, and nonplastic and nonsticky when wet; roots plentiful; strongly acid; clear, irregular boundary; horizon is 1 to 3 inches thick.

A_{12} 1½ to 3 inches: grayish-brown (2.5Y 5/2), gravelly, very light loam; single grain; soft to very slightly hard when dry, very friable when moist, and nonplastic and nonsticky when wet; roots fairly plentiful; very strongly acid; clear, irregular boundary; horizon is 1 to 3 inches thick.

A_2 3 to 14 inches: light yellowish-brown (10YR 6/4), gravelly, very light loam or heavy sandy loam; moderate, coarse, crumb structure; slightly hard when dry, friable when moist, and slightly plastic and very slightly sticky when wet; roots rather few; very strongly acid; clear, irregular boundary; horizon is 8 to 12 inches thick.

B_1 14 to 18 inches: pale-brown (10YR 6/3) gravelly loam; weak, medium, subangular blocky and weak, fine, granular structure; slightly hard when dry, friable when moist, and slightly plastic and very slightly sticky when wet; roots few; abundant fine and medium and a few large pores; this horizon has some of the characteristics of an old surface layer that has been buried and is transitional between the surface layer and the true subsoil; strongly acid; clear, irregular boundary; horizon is 3 to 5 inches thick.

B_{21} 18 to 38 inches: reddish-yellow (5YR 6/8), heavy fine sandy loam containing very little silt; compound, very weak, medium, platy and weak, fine, irregular, subangular blocky structure; hard and brittle when dry, friable or firm and slightly brittle when moist, and slightly plastic and slightly sticky when wet; a few roots in upper part; abundant fine pores; contains many small inclusions of the B_{22m} material

described below; very strongly acid; clear to abrupt, wavy to irregular boundary; horizon is 18 to 26 inches thick.

B_{22m} 38 to 90 inches +: red (2.5YR 4/8 or 10R 4/8), light fine sandy clay loam containing very little silt; moderately strong, coarse, platy structure, crushing under pressure to finer platy lenses; very compact; very hard and brittle when dry, firm and brittle when moist, and moderately plastic and moderately sticky when wet; no roots; common fine pores, mostly horizontal; this fragipan is a very compact clay-sand mixture with practically no silt and a notable absence of clay skins; upper part contains some inclusions of B_{21} horizon material; very strongly or extremely acid.

Some horizons may be very thin or absent; this is particularly true of the B_1 horizon, and, in some places, of the A_{12} horizon. The lower subsoil is in some places less red than described but is everywhere compact and platy. Stones and boulders are present in some areas.

Laidig gravelly loam, 0 to 3 percent slopes (LaA).—This is the nearly level and least stony soil of the Laidig series. The profile is like the one described. Although this soil is gravelly, strongly acid, and not highly productive, it can be cultivated safely with ordinary good farming methods. The 110 acres are in capability unit I–4.

Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded (LaB2).—This soil occupies 1,278 acres. About half of it has been cleared and used for general crops or orchards. Because of the slope, the hazard of erosion is a definite one. The soil is in capability unit IIe–4.

Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded (LaC2).—A profile of this soil was described as representative of the series. Because of the slope, there is an erosion hazard, and the 1,574 acres are in capability unit IIIe–4. About 46 acres have been severely eroded; these areas should have special treatment to control erosion.

Laidig gravelly loam, 15 to 25 percent slopes, moderately eroded (LaD2).—The hazard of erosion strongly limits use of this soil for cultivated crops. There are 479 acres in capability unit IVe–3. Included are about 33 acres that are severely eroded, which should be treated as if in capability unit VIe–2.

Laidig very stony loam, 8 to 25 percent slopes (LbD).—This soil has many stones and a few boulders on the surface and in the profile. On the average, about 50 percent of the surface is occupied by stones. This soil is, therefore, not suited to cultivation, but it can be used to some extent for grazing or can be left in woodland. There are 722 acres, in capability unit VIs–2.

Laidig very stony loam, 15 to 45 percent slopes, moderately eroded (LbE2).—This soil is so steep and stony that grazing is not practical. Forests should be maintained and cleared areas should be reforested. The soil occupies 110 acres and is in capability unit VIIs–2.

Landisburg Series

The Landisburg series consists of moderately well drained, gravelly soils on the foot slopes of ridges where there are colluvial deposits of cherty limestone material. The Landisburg soils have some degree of platy structure throughout their profile and have a fine and very dense, cherty subsoil. They lie below areas of better drained soils, chiefly of the Elliber and Frederick series, which have been developed directly on the cherty limestone.

The Landisburg soils occur in the western part of the county, mostly in the Elbow Ridge area. They are not extensive, nor are they highly productive. They need intensive erosion control and some artificial drainage for full use, and they are somewhat difficult to manage.

Profile of Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded, in a forested area just west of Long Hollow Road, nine-tenths of a mile south of the Pennsylvania State line:

A_1 0 to 3 inches: very dark grayish-brown (10YR 3/2) cherty silt loam; compound, weak, thin, platy and strong, fine, crumb structure; slightly hard when dry, friable but slightly brittle when moist, and moderately plastic and moderately sticky when wet; roots abundant; strongly acid; clear to abrupt, wavy boundary; horizon is 1 to 4 inches thick.

A_2 3 to 9 inches: yellowish-brown (10YR 5/4), cherty, light silt loam; compound, weak, thin, platy and moderate, fine, crumb structure; moderately hard when dry, friable but slightly brittle when moist, and moderately plastic and moderately sticky when wet; roots plentiful; very strongly acid; clear to abrupt, wavy boundary; horizon is 4 to 7 inches thick.

B_1 9 to 12 inches: brownish-yellow (10YR 6/6), cherty, heavy silt loam; compound, weak, medium, platy and moderate, fine, subangular blocky structure; moderately hard when dry, moderately firm and brittle when moist, and plastic and sticky when wet; roots few; very strongly acid; clear, wavy boundary; horizon is 3 to 5 inches thick.

B_{2tm} 12 to 32 inches: variegated, about 75 percent strong-brown (7.5YR 5/6) and 25 percent yellowish-brown (10YR 5/4), cherty, heavy clay loam; compound, moderate, coarse, platy and strong, medium, blocky structure; compact and dense; hard when dry, firm and brittle when moist, and plastic and sticky when wet; practically no roots; very strongly acid; clear, wavy boundary; horizon is 15 to 24 inches thick.

C_{gm} 32 to 42 inches +: strongly variegated yellowish-brown, strong-brown, and olive-gray (10YR 5/4, 7.5YR 5/8, and 5Y 5/2) cherty silty clay loam or clay loam; somewhat gritty; strong, fine to medium, platy structure; very hard when dry, firm and brittle when moist, and plastic and sticky when wet; no roots; very slowly permeable; very strongly acid.

There are common seepage spots or wet-weather springs. At such places the first three horizons are darker in color and thinner than in the typical profile described and the claypan B_{2tm} horizon is closer to the surface. There are some small areas of cherty loam mixed with the cherty silt loam. In many spots the surface soil is quite gritty, containing some medium and coarse sand and very fine gravel. The Landisburg soils are rather wet and slow to warm in spring. The water table is normally fairly deep, but it comes close to the surface in wet weather.

Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded (LcB2).—This soil has the profile that is described. Because the subsoil is tight, runoff is very high. Although the soil is only moderately well drained, the control of erosion is a more significant problem than drainage. For this reason, the 65 acres of this soil are in capability unit IIe–13.

Landisburg cherty silt loam, 8 to 25 percent slopes, moderately eroded (LcD2).—On this strongly sloping soil, the erosion hazard is great. There are 143 acres, in capability unit IIIe–13.

Largent Series

The Largent series consists of moderately well drained soils on flood plains and in depressions, in areas of acid, red shale and sandstone. The Largent soils are made up of alluvium washed mostly from soils of the Calvin series. Natural drainage is partially retarded. There has been a very slight degree of soil profile development, but not enough to be of any particular significance.

The Largent soils are not extensive and are used mostly for corn, hay, and pasture. Some areas are still in woodland.

Profile of a Largent silt loam, in a forested area three-tenths of a mile west of State Road No. 615, and one-half mile south of the Pennsylvania State line:

A_1 0 to 12 inches: dark reddish-gray (5YR 4/2), light silt loam containing a noticeable amount of very fine sand; very weak, fine, granular structure; very slightly hard when dry, friable when moist, and slightly plastic and very slightly sticky when wet; roots abundant; slightly acid; gradual to clear, wavy boundary; horizon is 8 to 12 inches thick.

C_1 12 to 25 inches: dark reddish-gray (5YR 4/2) silt loam; weak, very fine, platy structure; compact; hard when dry, firm and somewhat brittle when moist, and moderately plastic and moderately sticky when wet; roots plentiful in upper portion; many fine but few large pores; medium acid; clear to abrupt, wavy boundary; horizon is 10 to 20 inches thick.

C_{2g} 25 to 48 inches +: reddish-brown (5YR 4/4), heavy fine sandy loam; about 15 percent medium to coarse, distinct mottles of yellowish red (5YR 5/8), and many very small specks of indeterminate gray; compound, very weak, very coarse, platy and weak, coarse, blocky structure; very hard when dry, moderately firm when moist, and nonplastic and nonsticky when wet; no visible roots; medium acid.

Although the only mapping unit is named as silt loam, there are some small included spots of fine sandy loam. Depth to the mottled C_{2g} horizon ranges from about 14 to 28 inches. The water table is near the surface for fairly long periods. The soil is rather cold in spring, and may be flooded for brief periods.

Largent silt loam (Le).—This soil has the profile that is described. Because of the impeded drainage, the soil was placed in capability unit IIw–7. A few areas may be frequently covered by floodwaters. Wherever this is true, the intensity of use will depend on the frequency and pattern of flooding. There are 157 acres in the county.

Leadvale Series

The Leadvale series consists of moderately well drained soils on colluvial deposits that consist of acid shale and sandstone material at the base of slopes. In Washington County the materials have accumulated at the base of some slopes of soils of the Berks, Calvin, and Montevallo series. The Leadvale soils are in widely scattered, small areas, all in the western part of the county.

The Leadvale soils are suitable for most crops, but are wet at certain seasons and are slow to warm up in spring.

Profile of Leadvale gravelly silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated area on Long Hollow Road, just north of the entrance of the Tonoloway Rod and Gun Club:

A_p 0 to 7 inches: yellowish-brown (10YR 5/4) gravelly silt loam; moderate, medium, crumb and weak to moderate, fine, subangular blocky structure; moderately hard when dry, friable when moist, and moderately plastic and slightly sticky when wet; roots abundant; gravel is mostly fine, consisting of both sandstone and shale; strongly acid; clear, smooth to wavy boundary; horizon is 6 to 8 inches thick.

B_{21} 7 to 22 inches: yellowish-brown (10YR 5/4), gravelly, light silty clay loam; moderate, medium, subangular blocky structure; hard when dry, friable to firm when moist, and plastic and sticky when wet; roots fairly plentiful; many fine and some medium pores; gravel is coarser than in plow layer; very strongly acid; gradual, wavy to irregular boundary; horizon is 10 to 16 inches thick.

B_{22m} 22 to 36 inches: light olive-brown (2.5Y 5/4) gravelly and channery silty clay loam; about 20 percent fine, prominent mottles of strong brown (7.5YR 5/6); compound, weak, medium, platy and strong, fine to medium, subangular blocky structure; very compact; hard and brittle when dry, firm and brittle when moist, and plastic and sticky when wet; practically no roots; very slowly permeable; thin, grayish silt coatings on aggregates in upper part; this is a siltpan or fragipan layer; very strongly acid; clear, wavy boundary; horizon is 12 to 20 inches thick.

C_g 36 to 42 inches +: bluish-gray (5Y 5/1 with a bluish cast) channery silty clay loam; about 60 percent fine and medium, distinct mottles of olive and olive brown (5Y 5/4 and 2.5Y 4/4); very weak, medium, platy structure; hard when dry, firm and somewhat brittle when moist, and plastic and sticky when wet; very slowly permeable; no roots; strongly or very strongly acid.

In some places the soil is rather shallow, with residual material or bedrock within 3 feet of the surface. In some places the B_{22m} horizon is less compact than that in the profile described. These soils tend to heave in winter. They are of rather low fertility but are fairly productive of some crops under good management.

Leadvale gravelly silt loam, 0 to 3 percent slopes (LgA).—This nearly level soil can be cultivated without great risk of erosion. Surface drainage is particularly slow, and the soil tends to be wet and cold. It is in capability unit IIw–1. There are 49 acres.

Leadvale gravelly silt loam, 3 to 8 percent slopes, moderately eroded (LgB2).—A profile of this soil is described. The slopes are moderate, and there has been some erosion. The erosion hazard is more significant than the somewhat impeded drainage. There are 475 acres. The soil is in capability unit IIe–13.

Leetonia Series

The Leetonia series consists of excessively drained, extremely acid, stony soils on coarse, light-colored sandstone. They resemble the Dekalb soils, but they have more prominent horizons and, generally, a thicker surface layer. In this county they were mapped only in undifferentiated units with Dekalb soils.

Profile of Leetonia very stony sandy loam, 0 to 25 percent slopes, in a forested area about 200 yards south of the caretaker's office in the Washington Monument State Park, just below the summit of Monument Knob on South Mountain:

A_1 0 to 4 inches: very dark brown to black (10YR 2/2 or 2/1) very stony sandy loam; strong, fine, crumb structure; soft to very slightly hard when dry, very friable when moist, and nonplastic but very slightly sticky when wet; roots plentiful; medium acid; abrupt, irregular boundary; horizon is 2 to 6 inches thick.

A_2 4 to 9 inches: pale-brown (10YR 6/3), very stony and very gritty coarse sandy loam to loamy coarse sand; weak, granular structure to single grain; slightly hard and

brittle when dry, friable when moist, and nonplastic but very slightly sticky when wet; a few large, woody roots; many medium and coarse pores; extremely acid; clear, irregular boundary; horizon is 4 to 8 inches thick.

B_2 9 to 22 inches: yellowish-brown (10YR 5/6), very stony and very gritty coarse sandy loam; distinctly finer or heavier in texture than horizon A_2; weak, medium, blocky structure; slightly cemented; moderately hard when dry, firm and brittle when moist, and slightly sticky and very slightly plastic when wet; more fine roots than in horizon A_2; moderately rapidly or rapidly permeable; extremely acid; clear, irregular boundary; horizon is 12 to 24 inches thick.

C 22 to 42 inches +: marbled or variegated, 80 percent light brownish-gray (2.5Y 6/2) and 20 percent reddish-yellow (7.5YR 6/6), very stony and very gritty, decomposed sandstone of coarse sandy loam texture; inherited very weak, slightly platy structure; hard when dry, firm and brittle when moist, slightly sticky and very slightly plastic when wet; a very few roots; extremely acid.

There is considerable variation in the thickness of the two upper horizons; in some places they are extremely thin. The B_2 horizon in some places is loose, not so strongly cemented, and not so strongly colored as the one described.

Lehew Series

The Lehew series consists of excessively drained, shallow, stony soils on red to dark-red, acid sandstone. They resemble the Dekalb soils, except in color, but they have a redder profile, particularly in the lower subsoil and in the substratum. The Lehew soils also have somewhat more prominent horizons than the Dekalb soils.

Lehew soils were not mapped alone in this county, but are in undifferentiated mapping units with Dekalb soils.

Profile of Lehew very stony loam, 0 to 25 percent slopes, in a forested area just north of U.S. Highway No. 40, about 200 yards east of the highway crest over Fairview Mountain:

A_1 0 to 3 inches: very dark grayish-brown (10YR 3/2) very stony loam; weak, medium, crumb structure; soft to slightly hard when dry, very friable when moist, and slightly plastic and slightly sticky when wet; roots rather abundant; strongly acid; clear, wavy boundary; horizon is 1 to 3 inches thick.

A_2 3 to 5 inches: brown (10YR 5/3) very stony loam; weak, medium, crumb structure; slightly hard when dry, very friable when moist, slightly plastic and slightly sticky when wet; roots rather plentiful; many pores of all sizes; very strongly acid; abrupt, wavy boundary; horizon is 2 to 4 inches thick.

B_1 5 to 11 inches: dark yellowish-brown (10YR 4/4) to dark-brown (7.5YR 4/4) very stony loam; weak, fine to medium, subangular blocky structure; slightly hard when dry, friable when moist, slightly plastic and slightly sticky when wet; roots few; many fine and medium pores; very strongly acid; gradual, irregular boundary; horizon is 5 to 10 inches thick.

B_2 11 to 20 inches: reddish-brown (2.5YR 5/4 with a slight purplish cast) very stony gritty loam; moderate, fine to medium, subangular blocky structure; hard when dry, friable to somewhat firm when moist, slightly plastic and slightly sticky when wet; roots few; many fine and medium pores; very strongly acid; gradual, irregular boundary; horizon is 8 to 18 inches thick.

C 20 to 36 inches +: reddish-brown (5YR 5/3), stony and very channery loam; inherited very weak, laminar structure; very few roots; moderately permeable; consists mostly of red sandstone fragments with some fine material; very strongly acid.

599553—62——4

In many places the entire profile is reddish brown and is distinctly more reddish in the A_2 and B_1 horizons than the profile described. The Lehew soils are slightly less coarse in texture throughout than either the Dekalb or the Leetonia soils.

Lindside Series

The Lindside series consists of moderately well drained soils that were formed from alluvial materials in the limestone area. The materials are medium or fine textured. They were washed from areas of upland soils underlain by limestone, such as soils of the Hagerstown, Duffield, Frankstown, and Frederick series. The Lindside soils are on bottom lands and also in upland depressions, around drainage heads, and on foot slopes close to smaller drainageways. They are commonly near areas of Huntington soils, which are better drained, and with Dunning and Melvin soils, which are more poorly drained, all from the same or similar materials.

Most areas of Lindside soils in the county have been cleared. These soils are commonly used for corn or pasture, although other general crops are grown where drainage has been improved.

Profile of Lindside silt loam, in a forest adjacent to Roundtop Road, three-tenths of a mile south of its intersection with Orchard Road, about 1 mile north of Cohill:

A_1 0 to 14 inches: brown (10YR 4/3) silt loam; weak, medium to coarse, crumb structure; moderately hard when dry, friable when moist, and moderately plastic and moderately sticky when wet; roots abundant; slightly acid; clear, smooth boundary; horizon is 12 to 15 inches thick.

C_1 14 to 26 inches: dark yellowish-brown (10YR 4/4) silt loam; common, fine specks of very dark gray; compound, weak, medium, platy and very weak, fine to medium, subangular blocky structure; hard when dry, rather firm when moist, and moderately plastic and slightly sticky when wet; roots plentiful in upper part; many fine and some medium pores; moderately alkaline; gradual, irregular boundary; horizon is 6 to 12 inches thick.

C_{2g} 26 to 40 inches: olive (5Y 5/3) silt loam; about 20 percent medium, distinct mottles of strong brown (7.5YR 5/6); compound, weak, coarse, platy and very weak, medium, blocky structure; very hard when dry, firm when moist, and plastic and sticky when wet; no visible roots; contains a few remnants of fresh-water mollusk shells, and a few waterworn gravel fragments; moderately alkaline; clear, wavy boundary; horizon is 12 to 20 inches thick.

D_g 40 to 60 inches +: stratified sand, silt, and gravel; silty and sandy portions olive (5Y 4/3 with a bluish cast); about 15 percent fine, distinct specks of strong brown (7.5YR 5/6); weak, very coarse, platy structure; silty portion hard or very hard when dry, moderately firm when moist, and plastic and sticky when wet; no roots; variable permeability; bluish color fades completely to light olive gray when material is dried; gravel is mostly waterworn chert; moderately to strongly alkaline.

The bluish color in the lower substratum is not everywhere present, nor are the mollusk shells in the substratum. Some profiles contain more gravel throughout than the one described, and the substratum may not be so strongly alkaline. Lindside soils on the flood plains may be subject to flooding at times, but those in upland depressions are less susceptible. These soils are fairly wet and have a seasonally high water table.

Lindside silt loam (Lm).—This soil has the profile that is described. Wetness and the possibility of flooding are the greatest hazards on this soil. With improved drainage, the soil can be used for nearly all crops, but it is used mostly for corn and pasture. A few acres may have more frequent floods, which restrict their use to sod crops and grazing. On 45 acres the surface soil is rather gravelly. The 2,435 acres are in capability unit IIw–7.

Lindside silt loam, local alluvium (Ln).—This soil is like Lindside silt loam, but it is located in upland depressions instead of on flood plains. It is much less likely to be flooded than the soil on the bottom lands. Impeded drainage and seasonal excess water are the chief hazards, and the 488 acres of this soil are in capability unit IIw–7.

Litz Series

The Litz series consists of somewhat excessively drained to excessively drained, shallow, skeletal soils that were developed on light-colored, acid shale that contains some thin beds of limy shale or limestone, or both. The Litz soils resemble the Montevallo soils in their general profile, but, since they were developed from and influenced by partially limy materials, they are somewhat more productive. The Litz soils are chiefly on ridges within the ridge and valley section of the western part of the county. They also occur on a few isolated ridges within the limestone valley in the northeastern part of the county, where they are intricately mixed with soils of the Teas series.

The Litz soils are fairly extensive. They are not widely used in agriculture, and most areas remain in forest. Some areas, however, are used for general farming or, more commonly, for orchards.

Profile of Litz shaly loam, 0 to 10 percent slopes, in a forested area just off Orchard Road, 1 mile south of its intersection with Roundtop Road, about one-half mile northwest of Cohill:

A_{11} 0 to 1 inch: black (10YR 2/1) loam with about 15 percent shale chips; weak, fine, crumb to granular structure; soft when dry, very friable when moist, and slightly plastic and slightly sticky when wet; roots matted; strongly acid; abrupt, wavy boundary; horizon is ½ inch to 3 inches thick.

A_{12} 1 to 3 inches: light yellowish-brown (10YR 6/4), shaly, heavy loam; weak to moderate, coarse, crumb structure; moderately hard when dry, friable when moist, and sticky and moderately plastic when wet; roots plentiful; about 25 percent shale; very strongly acid; clear, wavy boundary; horizon is 1 to 4 inches thick.

B/C 3 to 16 inches: brown (7.5YR 5/4) very shaly silt loam; compound, inherited, laminar and moderate, fine, blocky structure; hard when dry, firm when moist, and plastic and sticky when wet; a few large roots; at least 60 percent pale-brown to pinkish shale; strongly acid; abrupt, irregular to broken boundary; horizon is 10 to 20 inches thick.

D_r 16 inches +: hard, pale-brown, gray, or greenish-gray, slightly limy shale.

In spots there is a B horizon, but it is very thin. Because the soil is so thin, it easily becomes droughty in periods of low or poorly distributed rainfall. Locally, the soil is less acid than the described profile.

Litz channery loam, 3 to 10 percent slopes, moderately eroded (LoB2).—This soil has a profile like the one described, except that the shale fragments are larger and harder, and there are some hard, thin, flat fragments of sandstone on and in the soil. These sandstone fragments were derived from seams of that rock that are present at places in the shale, and some of them probably were deposited by gravity from higher areas of other soils. Although this soil is thin and droughty, risk of erosion is probably the most significant management problem. The soil is suitable for cultivation, with the proper precautions, including the selection of crops that can at least partially withstand drought. The 232 acres are in capability unit IIe–11.

Litz channery loam, 10 to 20 percent slopes, moderately eroded (LoC2).—On this sloping soil there is need for careful management and protection and careful selection of crops. There are 97 acres, in capability unit IIIe–31.

Litz channery loam, 10 to 20 percent slopes, severely eroded (LoC3).—Erosion has been severe on this thin and droughty soil, and very special management is necessary if the soil is to be cultivated. This soil is in capability unit IVe–31. It occupies 109 acres.

Litz shaly loam, 0 to 10 percent slopes (LsB).—This soil has the profile that is described as representative of the series. Slopes are not great, and there has been little, if any, erosion, but there is an erosion hazard. The soil is well suited to some crops, including orchards. There are 366 acres, in capability unit IIIe–31.

Litz shaly loam, 3 to 10 percent slopes, moderately eroded (LsB2).—This soil can be cultivated if it is properly managed and protected. The 632 acres are in capability unit IIIe–31.

Litz shaly loam, 10 to 20 percent slopes, moderately eroded (LsC2).—Because of its strong slopes, this soil demands careful management and protection if cultivated crops are to be grown. The management needed is that outlined for capability unit IVe–31. There are 1,493 acres.

Litz shaly loam, 10 to 20 percent slopes, severely eroded (LsC3).—This soil has been so severely eroded that further cultivation is not advisable. It is also more droughty than the normal uneroded soil. It should be managed as outlined for capability unit VIe–3. There are 604 acres.

Litz shaly loam, 20 to 30 percent slopes, moderately eroded (LsD2).—Cultivation produces a severe hazard of erosion on these slopes, and the 791 acres of this soil are in capability unit VIe–3. About 69 acres of the mapping unit are somewhat channery as well as shaly.

Litz shaly loam, 20 to 30 percent slopes, severely eroded (LsD3).—This Litz shaly loam is so steep and has been so severely eroded that it is not suitable for crops. With proper management, it could supply some grazing. The 579 acres are in capability unit VIIe–3. A few spots are channery.

Litz shaly loam, 30 to 45 percent slopes, moderately eroded (LsE2).—This soil is too steep and shallow for cultivation, although there has been only moderate erosion. Some grazing might be produced, however, if good stands of deep-rooted pasture plants can be established. The soil is in capability unit VIIe–3. It occupies 379 acres. There are a few channery spots.

Litz shaly loam, 30 to 45 percent slopes, severely eroded (LsE3).—On these slopes of severely eroded, thin soil, grazing is not practical. The areas should be re-

forested. This soil is in capability unit VIIe–3. It occupies 136 acres.

Litz shaly loam, 45 to 60 percent slopes (LsF).—This is the steepest Litz shaly loam. It is uneroded because all of it has remained in forest, and that is the best use. The 102 acres are in capability unit VIIe–3.

Litz-Teas channery silt loams, 0 to 8 percent slopes (LtB).—The Litz-Teas complexes consist of intricate mixtures of Litz soils and of the similar, but reddish, Teas soils. Even though this mapping unit is gently or moderately sloping, there is some threat of erosion. There are 193 acres, in capability unit IIe–11.

Litz-Teas channery silt loams, 3 to 15 percent slopes, moderately eroded (LtC2).—Enough erosion has taken place on this thin soil to limit its use for crops. Cultivated crops may be grown with the careful management to check erosion that is given for its capability unit, IIIe–31. There are 625 acres, many of them in orchards.

Litz-Teas channery silt loams, 8 to 15 percent slopes, severely eroded (LtC3).—Erosion has been so severe on these moderate slopes that cropping must be very strongly limited if further damage is to be prevented. The 126 acres are in capability unit IVe–31.

Litz-Teas channery silt loams, 15 to 25 percent slopes, moderately eroded (LtD2).—Erosion has not been severe on these soils, but slopes are so great that cropping must be severely limited. There are 164 acres, in capability unit IVe–31.

Litz-Teas channery silt loams, 15 to 25 percent slopes, severely eroded (LtD3).—Erosion has been so active that these soils are of little use for other than deep-rooted sod plants or trees. The 167 acres are in capability unit VIe–3.

Litz-Teas channery silt loams, 25 to 45 percent slopes, moderately eroded (LtE2).—These slopes are too steep and the soils too thin for safe cultivation, but sod crops can be produced. The soils occupy 56 acres and are in capability unit VIe–3.

Melvin Series

The Melvin series consists of poorly drained soils of the flood plains, made up of fine materials that were washed from limestone soils. The soils are more poorly drained than either the Huntington or Lindside soils of the same flood plains, but they are not so poorly drained as the Dunning soils.

The Melvin soils were also mapped as parts of undifferentiated units with the Dunning soils. These undifferentiated units have been listed after the discussion of the Dunning series.

Profile of Melvin silt loam at a point in the flood plain of Grove Creek just north of the Smithsburg-Leitersburg Road, about 75 yards northwest of its intersection with Durberry Road:

A_p 0 to 10 inches: light olive-brown (2.5Y 5/4) silt loam or light silty clay loam; no apparent structure; hard to very hard when dry, moderately firm when moist, and plastic and sticky when wet; roots relatively few; many fine pores and some worm channels; mildly to moderately alkaline; abrupt, smooth boundary; this is the recent overwash deposit and is the present surface soil; horizon is 8 to 12 inches thick.

C_{1g} 10 to 18 inches: dark grayish-brown to olive-gray (2.5Y 4/2 to 5Y 4/2) silt loam; 5 to 10 percent medium, distinct splotches of reddish yellow (7.5YR 6/8); moderate, medium to coarse, crumb structure; moderately hard when dry, friable when moist, and moderately plastic and moderately sticky when wet; few roots; many fine and a few large pores and worm channels; this horizon was the surface soil before the overwash was deposited; moderately alkaline; abrupt, smooth boundary, except that fingers extend downward through old root channels or subsoil cracks into the horizon below; horizon is 6 to 10 inches thick.

C_{2g} 18 to 36 inches +: pale-olive (5Y 6/4) silty clay loam; about 30 percent specks and spots of light and dark gray, olive gray, and olive yellow; compound, moderate, coarse, platy and strong, medium, subangular blocky structure; very hard when dry, firm when moist, and very plastic and very sticky when wet; no roots; moderately to strongly alkaline.

The surface layer varies in thickness from place to place. The subsoil is nearly everywhere alkaline. Locally, the immediate surface layer will be more brown than in the typical profile described, or somewhat reddish, depending upon the nature of the most recent deposit at that point. This is a poorly drained soil and one that may still be subject to flooding. It is wet for long periods, and the water table is close to the surface in wet seasons.

Melvin silt loam (Me).—A profile of this soil was described. The subsoil and substratum are calcareous in some places. Artificial drainage is needed for full use and production. Limitations in use after drainage and the frequent flood hazard are the reasons why the soil is placed in capability unit IIIw–2. A few areas that are more frequently damaged by flooding are better used for permanent grass or woodland. There are 146 acres in the county. The slope is almost everywhere less than 3 percent.

Monongahela Series

The Monongahela series consists of moderately well drained, acid, brown soils on very old river terraces. The soils have a thick, strongly developed fragipan (siltpan) in the lower subsoil. They developed in old alluvial deposits that originated in areas of acid sandstone and shale. The areas are mostly along the Potomac River, but a few small areas are elsewhere in the county. The Monongahela soils are less well drained than the brown Holston soils and the reddish Waynesboro soils, but they are much better drained than the Tyler soils. All of these soils are located on the same terrace formations. Most of the acreage of Monongahela soils in the county has been cleared.

Profile of Monongahela gravelly loam, 3 to 8 percent slopes, moderately eroded, in a once cultivated, but now idle, area 50 yards north of the Western Maryland Railroad tracks, one-half mile west of Shankton Road:

A_p 0 to 8 inches: brown (10YR 5/3), gravelly, heavy loam; moderate, fine, crumb structure; moderately hard when dry, friable when moist, and moderately plastic and moderately sticky when wet; roots plentiful; about 15 percent waterworn sandstone gravel; medium acid; abrupt, smooth boundary; horizon is 6 to 8 inches thick.

B_{21} 8 to 18 inches: yellowish-brown (10YR 5/6) gravelly silt loam; compound, weak, coarse, platy and moderate, medium, subangular blocky structure; moderately hard when dry, slightly firm and somewhat brittle when moist, and moderately plastic and

moderately sticky when wet; roots plentiful; many fine and medium pores; about 20 percent waterworn gravel; medium acid; clear, smooth boundary; horizon is 8 to 10 inches thick.

B_{22m} 18 to 32 inches: strong-brown (7.5YR 5/6), gravelly, light silty clay loam; about 40 percent horizontal streaks of light yellowish brown (10YR 6/4); compound, strong, medium, platy and strong, fine to medium, blocky structure; very hard when dry, firm and very brittle when moist, and plastic and sticky when wet; very few roots; slowly permeable; this is a true fragipan, or siltpan; about 15 percent gravel; very strongly acid; gradual, smooth boundary; horizon is 12 to 18 inches thick.

B_{3m} 32 to 50 inches: variegated by distinct, mostly horizontal layers, yellowish-red and brownish-yellow (5YR 5/6 and 10YR 6/6), gravelly, heavy silt loam to light silty clay loam; compound, strong, coarse, platy and very strong, medium, blocky structure; very hard when dry, firm and very brittle when moist, and plastic and very sticky when wet; no visible roots; about 30 percent gravel; a fragipan horizon; very strongly acid; fairly clear, smooth boundary; horizon is 15 to 24 inches thick.

C 50 to 60 inches +: yellowish-red (5YR 5/6), very gravelly, decomposed shale of loam texture; about 20 percent medium, distinct mottles of reddish yellow (7.5YR 6/6); weak, coarse, platy structure; moderately hard when dry, firm when moist, and sticky and slightly plastic when wet; no roots; about 40 percent waterworn sandstone gravel; extremely acid.

The fragipan layers may be from about 2 to nearly 6 feet thick. Some areas have a more yellowish and less brown surface layer and subsoil than the horizons described. Cultivated areas commonly have many surface rills and small gullies that may cut into the fragipan. The fragipan slows down internal drainage, increasing the runoff and the hazard of erosion. The Monongahela soils are fairly wet and cold in spring, although in dry midsummer weather their available moisture is generally low. Thus, they tend to be too wet part of the year and somewhat droughty at other times.

Monongahela gravelly loam, 3 to 8 percent slopes, moderately eroded (MgB2).—This soil has the profile that is described. The threat of erosion from the runoff on these slopes is a more significant management problem than the impeded drainage, and the soil has been placed in capability unit IIe–13. There are 301 acres.

Monongahela gravelly loam, 8 to 15 percent slopes, moderately eroded (MgC2).—On these slopes runoff is rapid and the erosion hazard is great. The 110 acres are in capability unit IIIe–13.

Monongahela silt loam, 0 to 3 percent slopes (MhA).—This soil has a profile like the one described, but it is less gravelly throughout and the surface soil is more silty. On these nearly level areas, both runoff and internal drainage are slow and wetness is a greater hindrance to use than the threat of erosion. The 443 acres are in capability unit IIw–1.

Monongahela silt loam, 3 to 8 percent slopes, moderately eroded (MhB2).—This is the most extensive soil in the Monongahela series in the county. Over most of the acreage, much of the surface layer has been lost. There are many gullies in places, but most of them are shallow; on 24 acres erosion has been severe. This soil can be used for all suitable crops with management to prevent further damage. It occupies 861 acres and is in capability unit IIe–13.

Monongahela silt loam, 8 to 15 percent slopes, moderately eroded (MhC2).—Because care is required to cultivate the slopes safely, the 223 acres of this soil are in capability unit IIIe–13.

Monongahela silt loam, 15 to 25 percent slopes, moderately eroded (MhD2).—This is the steepest soil of the Monongahela series in the county. Because of the slope and the degree of past erosion, the soil is suited to tilled crops grown only infrequently in very long rotations. If tilled crops are grown, conservation measures must be carefully applied. The 57 acres are in capability unit IVe–9.

Montevallo Series

The Montevallo series consists of very shallow, excessively drained, skeletal soils. The soils have a weakly developed A horizon and practically no B horizon. The surface layer directly overlies partially decomposed and hard, gray to pale-brown shales. In some places the parent shales contain a small amount of lime.

The Montevallo soils occur mostly on the shale ridges north and west of Fairview Mountain, but some are on ridges and steep areas on both sides of Conococheague Creek. Only some of the most gently sloping and least eroded Montevallo soils are suitable for regular cultivation, and then only with very careful management. These soils are low in natural fertility and are not very productive.

Profile of Montevallo shaly loam, 0 to 10 percent slopes, moderately eroded, in a forested area on Blair Valley Road one-half mile south of the Pennsylvania State line:

A_1 0 to 4 inches: brown (10YR 4/3) shaly loam; moderate to strong, medium, crumb structure; slightly hard when dry, very friable when moist, and nonplastic but slightly sticky when wet; roots plentiful; about 30 percent partially decomposed shale; strongly acid; clear, wavy boundary; horizon is 2 to 6 inches thick.

C 4 to 12 inches: yellowish-brown (10YR 5/4) very shaly loam; strong, medium, crumb structure; slightly hard when dry, friable when moist, and nonplastic but slightly sticky when wet; roots few; 70 to 95 percent shale, partially decomposed; strongly acid; abrupt, wavy boundary; horizon is 6 to 10 inches thick.

D_r 12 inches +: light brownish-gray, pale-brown, and light yellowish-brown (2.5Y 6/2, 10YR 6/3, and 2.5Y 6/4), moderately hard to very hard shale.

Locally, the immediate surface layer in forested areas is almost black. Cultivated areas have a yellowish-brown to light brownish-gray surface layer; some eroded areas have a surface layer that is more brown and less gray. The soil may be more acid than that described in the profile. In the extreme western part of the county, the C horizon may have a slight reddish cast, where the Montevallo soils are close to soils of the Calvin series.

Montevallo shaly loam, 0 to 10 percent slopes, moderately eroded (MmB2).—This soil has the profile that is described in detail. Erosion is a hazard, but it is less of a management problem on these thin, droughty soils than the maintenance of moisture and fertility. The 1,857 acres are, therefore, in capability unit IIIs–2.

Montevallo shaly loam, 10 to 20 percent slopes, moderately eroded (MmC2).—On these slopes the risk of erosion is the most important management problem, but the soil also has hazards of droughtiness and low fertility. The soil is in capability unit IVe–32. It occupies 2,972 acres.

Montevallo shaly loam, 10 to 20 percent slopes, severely eroded (MmC3).—This soil has been so severely eroded that there is little but shale left. With very careful management and erosion control, and with strong limitations on grazing, the soil can be used for pasture. There are 1,628 acres, in capability unit VIe–3.

Montevallo shaly loam, 20 to 30 percent slopes, moderately eroded (MmD2).—Erosion has not been severe on this soil, but there is such a strong risk of erosion that the soil should not be used for cultivated crops. The 1,812 acres are in capability unit VIe–3.

Montevallo shaly loam, 20 to 30 percent slopes, severely eroded (MmD3).—This steep soil has been so severely eroded that it should not be cultivated, and grazing will be hazardous. The soil should be reforested wherever feasible. There are 623 acres, in capability unit VIIe–3.

Murrill Series

The Murrill series consists of soils that are deep and well drained. The soils developed on a combination of two very different kinds of materials. They are on extensive colluvial fans of material from acid rocks, mostly sandstone and quartzite. The rocks have been moved by gravity from mountains and ridges out into the valleys over limestone materials. The mantle of acid material is everywhere thin enough to allow the underlying limestone or limestone residuum to influence the soil that has been developed. In most places the surface layer has been strongly influenced by the limestone. There are spots, however, where the surface layer and the upper subsoil have been developed in nearly pure quartzite or sandstone material and the lower subsoil has been developed in limestone residuum.

The Murrill soils are extensive and important; they make up about 6 percent of the county. These soils occur at many places on the fringes of the limestone valley, but they are most extensive in the Clear Spring area just east of Fairview Mountain. The topography is generally favorable for agriculture, mostly undulating to gently rolling.

The Murrill soils are fertile, fairly easily managed, and highly productive under good management. Besides being deep, well drained, and productive, they have a high capacity for furnishing moisture to crops. Most of the acreage has excellent air drainage and is highly regarded for orchards, as well as for general farm crops and pasture. Nearly all areas are used for crops, pastures, or orchards, with only a few spots remaining in forest.

Profile of Murrill silt loam, 0 to 3 percent slopes, in a cultivated field just back of the new elementary school at Clear Spring:

A_p 0 to 7 inches: dark grayish-brown (10YR 4/2) silt loam; moderate, fine to medium, crumb structure; slightly hard when dry, friable when moist, and slightly plastic and moderately sticky when wet; roots abundant; occasional subangular to rounded sandstone gravel fragments; slightly acid; abrupt, smooth boundary; horizon is 6 to 8 inches thick.

B_1 7 to 17 inches: yellowish-brown (10YR 5/4) silt loam; weak to moderate, fine, subangular blocky structure; moderately hard when dry, friable when moist, and moderately plastic and moderately sticky when wet; roots plentiful; many fine and medium and some large pores; occasional gravel fragments; slightly acid; clear, wavy boundary; horizon is 6 to 10 inches thick.

B_{21} 17 to 26 inches: yellowish-brown (10YR 5/6), light silty clay loam; moderate to strong, fine and medium, blocky and subangular blocky structure; hard when dry, moderately firm when moist, and sticky and moderately plastic when wet; roots fairly common; many fine and medium pores; very few gravel fragments; slightly acid; gradual, wavy boundary; horizon is 8 to 12 inches thick.

B_{22} 26 to 40 inches: reddish-yellow (7.5YR 6/6) silty clay loam; strong, fine and medium, blocky structure; hard when dry, firm when moist, and sticky and plastic when wet; a few fine roots; fine pores; no gravel; common, self-colored clay skins and many black films on aggregates; medium acid; gradual to clear, wavy boundary; horizon is 12 to 20 inches thick. The horizon appears to be transitional between the dominantly sandstone upper materials and the limestone residuum materials below.

B_{23} 40 to 51 inches: strong-brown (7.5YR 5/6) silty clay loam; slightly variegated, with about 20 percent fine specks either more yellowish or more reddish than the base color; compound, strong, medium to coarse, platy and moderate, medium, subangular blocky structure; very hard when dry, firm when moist, and sticky and very plastic when wet; a very few fine roots; only fine pores; no gravel; common clay skins on block surfaces, with some plate surfaces coated with black; strongly acid; clear, wavy to irregular boundary; horizon is 8 to 12 inches thick.

C 51 to 72 inches +: strong-brown (7.5YR 5/8) very silty clay loam; very weak, platy to massive structure; hard when dry, moderately firm and brittle when moist, and plastic and slightly sticky when wet; occasional black specks; no gravel; medium to slightly acid.

Throughout the Murrill series, there is considerable variation in depth to the substratum, in content of gravel, in texture of the surface layer, and, most important, in the proportions of and the degree of mixing of the acid colluvial and the residual limestone materials. There is also some variation in color. Where limestone material is dominant, the soil is somewhat more red than described; where sandstone material is dominant, the upper part of the soil, in particular, is somewhat more yellow.

Murrill gravelly loam, 0 to 3 percent slopes (MoA).—This soil has a profile much like the one described in detail, except that its surface layer contains more gravel and less silt and clay. There is also more gravel throughout the profile. This soil is very gently sloping. It can be cultivated freely without danger of damage if good farming practices are followed. This soil occupies 1,479 acres and is in capability unit I–4.

Murrill gravelly loam, 0 to 8 percent slopes, moderately eroded (MoB2).—This is the most extensive Murrill soil. There are 9,485 acres; they can be cultivated with fairly simple practices to prevent further erosion and are well suited to all crops grown in the area. This soil is in capability unit IIe–4.

Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded (MoC2).—This is another extensive soil. With more careful management than that needed on the more gently sloping soil, it can be safely used for all kinds of farming. The 4,122 acres are in capability unit IIIe–4.

Murrill gravelly loam, 8 to 25 percent slopes, severely eroded (MoD3).—This soil has been severely damaged by erosion. Most of the original surface layer and, in some places, part of the subsoil have been eroded, and there are frequent gullies in most places. Further cultivation is not practical, but this soil can produce excellent

grazing if well sodded and managed. There are 84 acres, in capability unit VIe–2.

Murrill gravelly loam, 15 to 25 percent slopes, moderately eroded (MoD2).—The slope of this soil is critical enough so that cultivation should be limited to an occasional tilled crop in a long rotation with sod crops. The soil is well suited to sodded orchards. The 596 acres are in capability unit IVe–3.

Murrill gravelly loam, 25 to 45 percent slopes, moderately eroded (MoE2).—There are only 51 acres of this steep soil. Because of the slope, pasture would be a much more suitable and safe use than any cropping. This soil is in capability unit VIe–2.

Murrill gravelly sandy loam, 0 to 8 percent slopes (MrB).—This soil has a surface layer more sandy than that of the gravelly loam. The sand, like the gravel, is material remaining from the sandstone part of the parent material. The sand makes the soil somewhat less fertile and less productive than the other Murrill soils and tends to make it somewhat droughty. The 368 acres are in capability unit IIs–2.

Murrill gravelly sandy loam, 3 to 15 percent slopes, moderately eroded (MrC2).—On these slopes, where some erosion has already taken place, the hazard of erosion is of more significance in management than the sandy nature of the soil. Because of this combination of erosion hazard and sandy soil, the 678 acres are in capability unit IIIe–5.

Murrill gravelly sandy loam, 8 to 15 percent slopes, severely eroded (MrC3).—Cultivation causes a particular hazard of further erosion on this eroded, sloping, sandy soil. An occasional crop may be grown with proper management, but the soil is better suited to hay or grazing. The 84 acres are in capability unit IVe–5.

Murrill gravelly sandy loam, 15 to 25 percent slopes, moderately eroded (MrD2).—On this soil, erosion has not been severe, but, because the slopes are steep, there is a threat of erosion if cover is not maintained. The 88 acres are in capability unit IVe–5.

Murrill gravelly sandy loam, 15 to 25 percent slopes, severely eroded (MrD3).—This steep soil has been too severely eroded to permit any further cultivation. It should be kept in sod and carefully grazed, or it should be planted to trees. The soil occupies 46 acres and is in capability unit VIe–2.

Murrill silt loam, 0 to 3 percent slopes (MsA).—This is probably the best agricultural soil of the Murrill series. It has the profile that is described in detail. The surface layer is silt loam; the soil is nearly level; there is very little gravel to interfere with cultivation; and there has been practically no erosion. The 269 acres are in capability unit I-4.

Murrill silt loam, 0 to 8 percent slopes, moderately eroded (MsB2).—Erosion can be controlled on this sloping soil with the management suggested for its capability unit, IIe–4. The soil is suited to all the crops of the area, and it is especially good for orchards. There are 872 acres.

Murrill silt loam, 8 to 15 percent slopes, moderately eroded (MsC2).—Intensive erosion-control practices are required to keep this soil in a condition to continuously produce good crops. There are 214 acres, in capability unit IIIe–4.

Myersville Series

The Myersville series consists of deep, well-drained, brown soils developed in material weathered from metabasalt, a rock locally known as greenstone. The Myersville soils are somewhat similar to the Highfield soils, but they are more deeply weathered and more mature, and they have stronger colors and more strongly developed soil structure. The Myersville soils occur mostly at lower elevations in valleys, and the Highfield soils are mostly limited to higher elevations on ridges and mountains. The Fauquier soils were also developed in the same parent rock material, but they are much redder throughout their profile and are more maturely developed than the Myersville soils.

The Myersville soils are extensive in Washington County, particularly in the southeastern part. They are fertile and productive and are highly regarded for farming. Only a few spots, other than stony areas, remain in forest.

Profile of Myersville silt loam, 0 to 3 percent slopes, in a forest 100 yards west and 200 yards south of the intersection of Kaetzell Road with State Road No. 67, near Gapland:

A_1 0 to 3 inches: very dark brown (10YR 2/2) silt loam; moderate, fine, crumb structure; slightly hard when dry, very friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; medium acid; clear to abrupt, wavy boundary: horizon is 1 to 3 inches thick.

A_2 3 to 8 inches: brown (10YR 5/3) silt loam; moderate, medium, crumb structure; hard when dry, friable when moist, and moderately plastic and moderately sticky when wet; roots plentiful; many fine and medium and some large pores; strongly acid; clear, wavy boundary; horizon is 4 to 7 inches thick.

B_{21} 8 to 16 inches: strong-brown (7.5YR 5/8) gritty silty clay loam; moderate, medium, subangular blocky structure; very hard when dry, moderately firm when moist, and plastic and sticky when wet; roots rather plentiful; many fine and medium pores; strongly acid; gradual, wavy boundary; horizon is 6 to 12 inches thick.

B_{22} 16 to 38 inches: yellowish-red (5YR 5/8) silty clay loam to clay loam; strong, medium, blocky structure; very hard when dry, firm when moist, and plastic and very sticky when wet; few roots; many fine and some medium pores; thick self-colored clay skins and some black films on aggregate surfaces and in pores and root channels; very strongly acid; gradual, wavy to irregular boundary; horizon is 12 to 24 inches thick.

B_3 38 to 46 inches: variegated yellowish-red, reddish-yellow, yellow, and olive (5YR 5/6, 7.5YR 6/6, 10YR 7/6, and 5Y 5/3) gritty silty clay loam; weak to moderate, coarse, blocky structure; very hard when dry, firm and somewhat brittle when moist, and sticky and plastic when wet; very few roots; many fine and some medium pores; some pores and aggregates coated with yellowish-red clay skins or black films; very strongly acid; gradual, wavy to irregular boundary; horizon is 6 to 15 inches thick.

C 46 to 60 inches +: yellowish-brown (10YR 5/8), soft, decomposed metabasalt of clay loam texture; inherited laminar structure; moderately hard or hard when dry, firm and brittle when moist, and plastic and sticky when wet; some red clay flows and a few black films in upper part; contains some fragments of hard metabasalt schist; strongly acid.

Some of the Myersville soils are deeper than the profile described, ranging up to 6 feet or more of solum over the substratum. In such places the lower subsoil may

be somewhat more reddish than the one described. Some gravel and small stones are common, both of greenish metabasalt and of white quartzite, which is a common impurity in the metabasalt.

Myersville channery loam, 0 to 3 percent slopes (MvA).—The profile of this soil differs from that of the silt loam described in that the surface layer is somewhat less silty, and the entire soil, particularly the surface layer, contains many small, flat pieces of metabasalt or greenstone. Some of the fragments are hard, and some have been partly decomposed. This nearly level soil occupies only 47 acres, but it is of particular importance because it is in capability unit I–4. The soil can be cultivated regularly, without damage, if ordinary good farming methods, including rotations, are used.

Myersville channery loam, 3 to 10 percent slopes, moderately eroded (MvB2).—There are 1,331 acres of this good, gently sloping soil. The soil is in capability unit IIe–4.

Myersville channery loam, 10 to 20 percent slopes, moderately eroded (MvC2).—Special management to control or prevent erosion is necessary to keep this sloping soil in regular cultivation. There are 1,676 acres, in capability unit IIIe–4.

Myersville channery loam, 20 to 30 percent slopes, moderately eroded (MvD2).—On this strongly sloping soil, there is a hazard of erosion. Occasional cropping can be done if the soil is kept in tight vegetative cover, such as hay or pasture, most of the time. The soil occupies 418 acres and is in capability unit IVe–3.

Myersville channery loam, 30 to 45 percent slopes, moderately eroded (MvE2).—This is the steepest Myersville channery loam. Cultivation should not be attempted on it because the hazard of erosion is too great. The soil will produce excellent pasture if carefully sodded and not overgrazed. The 175 acres are in capability unit VIe–2.

Myersville channery silt loam, 3 to 10 percent slopes, severely eroded (MwB3).—This soil contains some inclusions of Myersville channery loam and of Myersville silt loam. There are 52 acres in capability unit IIIe–44.

Myersville channery silt loam, 10 to 30 percent slopes, severely eroded (MwD3).—This soil should not be cropped. Permanent sod for pasture or perhaps occasionally for hay would be a much safer use. The 57 acres are in capability unit VIe–2.

Myersville silt loam, 0 to 3 percent slopes (MxA).—This soil has the profile that is described as representative of the series. It is nearly level, contains very little gravel, and has not been appreciably eroded. This is an excellent soil for all purposes. The 131 acres are in capability unit I–4.

Myersville silt loam, 3 to 10 percent slopes, moderately eroded (MxB2).—This soil needs protection against erosion. There are 532 acres, in capability unit IIe–4.

Myersville silt loam, 10 to 20 percent slopes, moderately eroded (MxC2).—This soil is strongly sloping, and it needs to be protected against erosion. Fairly long rotations are in order. The soil is in capability unit IIIe–4. It occupies 153 acres.

Myersville very stony loam, 3 to 30 percent slopes, moderately eroded (MyE2).—About 40 percent of the acreage of this soil is occupied by stones and boulders of greenstone, some buried and many on the surface. The soil is too stony for cultivation, but it makes good pasture and perhaps will produce some hay crops. There are 1,428 acres, in capability unit VIs–2.

Myersville very stony loam, 30 to 55 percent slopes, eroded (MyF2).—This soil is so steep, so stony, and in some places so severely eroded that grazing is not practicable. It occupies 147 acres and is in capability unit VIIs–2.

Philo Series

The Philo series consists of moderately well drained to somewhat poorly drained soils of the flood plains. The soils are composed of fine materials that were washed originally from areas of acid, sedimentary rocks, chiefly sandstone and shale. Although the soil materials below the surface layer show some mottling as a result of impeded drainage and poor aeration, there has been no real soil profile development. The Philo soils are mostly in that part of the county west of Fairview Mountain, although part of the acreage is in the drainage area of Little Antietam Creek. The soils consist of materials essentially the same as those of the better drained Pope soils and the more poorly drained Atkins soils of the same areas.

The Philo soils are moderately extensive, but they have not been intensively used. Some hay and corn are grown, and some areas are in pasture.

Profile of Philo silt loam, in a forested area near the intersection of Draper Road and Harvey Road North:

A_1 0 to 13 inches: very dark grayish-brown (10YR 3/2) silt loam; very weak, fine to medium, crumb structure; hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; medium acid; gradual, smooth boundary; horizon is 10 to 16 inches thick.

C_{1g} 13 to 20 inches: dark grayish-brown (10YR 4/2) silt loam; about 20 percent fine, faint to distinct mottles of dark yellowish brown and dark olive gray (10YR 4/4 and 5Y 3/2); very weak, fine to medium, subangular blocky structure; hard when dry, friable to firm when moist, and moderately plastic and slightly sticky when wet; roots rather plentiful; many fine and medium pores; strongly acid; clear, smooth boundary; horizon is 9 to 12 inches thick.

C_{2g} 20 to 40 inches +: dark olive-brown (2.5Y 4/2) heavy silt loam; about 25 percent very coarse, prominent blotches of yellowish red (5YR 4/6); compound, weak, coarse, platy and very weak, fine or medium, flattened blocky structure; hard or very hard when dry, moderately firm when moist, and moderately plastic and moderately sticky when wet; very few roots; strongly acid; grades to sandy and gravelly materials.

The texture of the surface layer ranges from sandy loam to heavy silt loam, and some areas are quite gravelly. In some places the substratum is more olive colored than that described, with more prominent mottling in the C_{1g} horizon. The Philo soils are normally wet for considerable periods, and the water table is close to the surface. Some areas are flooded rather frequently.

Philo gravelly sandy loam (Pg).—The profile of this soil differs from the one described only in that it is less silty and more sandy and is gravelly throughout. The gravel is mostly waterworn sandstone. The surface layer tends to be somewhat more sandy than the substratum. A few areas that are subject to frequent floods should be

managed for sod crops and grazing. The 430 acres are in capability unit IIw–7.

Philo silt loam (Ph).—The profile of this soil is the one described for the series. Most areas are nearly level, but in many places the slope is about 3 percent. A few areas that are subject to frequent floods should be managed for sod crops and grazing. There are 1,254 acres, in capability unit IIw–7.

Pope Series

The Pope series consists of deep, well-drained soils of the flood plains. The soils are made up of the same kind of materials as the Philo soils, materials that were washed originally from soils on acid sandstone and shale. They are much better drained than the Philo soils, and do not show any evidence of soil-forming processes other than some darkening of the surface layer by organic matter.

The Pope soils are extensive in the county. They are mostly in the western part, in small, widely scattered areas along streams. The soils are nearly all in use, chiefly for corn, hay crops, and pasture, but some small grains are grown and even some orchards.

Profile of Pope fine sandy loam, in an area of grazed woods in the flood plain of Lanes Run near its crossing with Licking Creek Road:

A_1 0 to 16 inches: dark grayish-brown (10YR 4/2) fine sandy loam; weak, medium, crumb structure; moderately hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; many worm channels; slightly to medium acid; gradual, smooth boundary; horizon is 14 to 18 inches thick.

C 16 to 46 inches: brown (10YR 4/3), heavy fine sandy loam or very light silt loam; compound, very weak, medium, platy and weak, medium, crumb structure; hard when dry, friable when moist, and moderately plastic and moderately sticky when wet; roots plentiful in upper part; medium to strongly acid; abrupt, wavy boundary; horizon is 24 to 40 inches thick.

D 46 inches +: interbedded layers of gravel and brown sandy silt.

There is some variation in color. In some places the C horizon is more yellowish brown or more reddish brown than the one described. The reddish-brown colors are mostly in the soils in the extreme western part of the county, where at least part of the soil material has been washed from areas of Calvin soils. The texture ranges from sandy loam to silt loam, and some of the soils are stony or gravelly, or both. The gravelly D horizon is, in some places, many feet below the surface.

Pope fine sandy loam (Pn).—This soil has the profile that is described in detail, and it is the most extensive of the Pope soils in the county. Although there is some hazard of flooding, this soil is used for all the crops commonly grown. A few areas that could not be separated on the map are occasionally or frequently flooded. Their cropping intensity and pattern should be adjusted to the overflow hazard. There are 1,793 acres of this soil, in capability unit I–6. Most areas are nearly level, but in a few places the slope is as great as 8 percent.

Pope gravelly loam (Po).—This soil contains less sand and more gravel than Pope fine sandy loam. Most areas are nearly level, but in some places the slope is as great as 8 percent. There are 436 acres of this soil, in capability unit I–6.

Pope gravelly sandy loam (Pp).—Because this soil is sandy, it is slightly droughty. There are 446 acres of it. Most of the soil is nearly level, but some of it has slopes between 3 and 8 percent. The soil is in capability unit IIs–2.

Pope silt loam (Ps).—This Pope soil has a profile more silty and less sandy than the one described. It is productive and suitable for practically all uses. The 442 acres are in capability unit I–6. A few areas are occasionally or frequently overflowed, and cropping intensity and pattern should be adjusted accordingly.

Pope stony gravelly loam (Pt).—This Pope soil is too stony for normal cultivation. The stones were probably washed from nearby steep slopes during former heavy floods. The soil can be so managed as to make fairly good grazing, or it would make good woodland. Most of the soil is in forest. It occupies 87 acres and is in capability unit Vs–2.

Rocky Eroded Land

Areas of this land type consist of very severely eroded remnants of rocky to extremely rocky Hagerstown and Frankstown soils and a few areas of Corydon soils. The areas are more rocky than the areas of Eroded land, limestone materials. Rocky eroded land is sharply limited in usefulness, and its treatment is difficult.

Rocky eroded land (Rk).—There are 823 acres of this land type, in capability unit VIIs–1. Cultivation is impossible, and grazing is mostly impracticable. The best use for this land would be to have it reforested, mostly for watershed protection, although there might be some return from the woodland products.

Rohrersville Series

The Rohrersville series consists of poorly drained soils that were developed in fine materials washed from areas of Fauquier, Myersville, and Highfield soils. The fine materials were deposited in upland depressions, around heads of drains, or on narrow foot slopes. The original source of the fine materials was the metabasalt, or greenstone, that was weathered to form the parent material of those soils.

The Rohrersville soils occur only in small areas, but these are distributed through the greenstone areas of the county, especially in Pleasant Valley, which is drained by Israel Creek. Where drainage can be improved and controlled, the soils are well suited to some crops and are fairly productive. They are used mostly for corn and hay, but some small grain crops and soybeans are produced, and some areas are used for pasture.

Profile of Rohrersville silty clay loam, 0 to 8 percent slopes, moderately eroded, in a cultivated field about three-tenths of a mile southwest of Gapland:

A_p 0 to 6 inches: olive-brown (2.5Y 4/4) silty clay loam; very weak, platy structure, readily crushing to weak, fine and medium crumbs; moderately hard to hard when dry, friable to somewhat firm when moist, and moderately plastic and moderately sticky when wet; roots abundant; medium acid; clear, smooth boundary; horizon is 5 to 7 inches thick.

B_{21g} 6 to 15 inches: light olive-brown (2.5Y 5/4) silty clay loam; about 30 percent very fine, distinct mottles of gray and strong brown; compound, weak, medium, platy and weak, fine to medium, blocky structure; very hard when dry, firm and somewhat brittle when moist, and sticky and very plastic when wet; a few roots; strongly acid; abrupt, smooth boundary; horizon is 8 to 12 inches thick.

B_{22g} 15 to 36 inches +: olive (5Y 5/3) sandy clay loam to sandy clay; about 20 percent medium, distinct mottles of dark brown (7.5YR 4/4); compound, moderate, coarse, platy and moderate, medium, irregular, blocky structure; hard when dry, firm when moist, and plastic and sticky when wet; no visible roots; very slowly permeable; strongly acid.

In some places there are recent, thin deposits of washed-in material on the surface. This material is more reddish than that in the profile described. In places there are soft, iron concretions in the lower subsoil. Locally the soils are underlain either by bedrock or by an old, buried soil that is within 3 or 4 feet of the surface. The soils are subject to temporary periods of flooding or ponding.

Rohrersville silty clay loam, 0 to 8 percent slopes, moderately eroded (RoB2).—This is the only soil of this series in the county. Erosion has been active, and there are some rills and small gullies. Because wetness is a greater hazard and management problem than the risk of erosion, the 216 acres are in capability unit IIIw–1.

Stony Land

This land type is so stony and bouldery, contains so many outcrops of rock, and is so rough that its uses are strongly limited. In general, it is not suitable for grazing and does not produce much if used for woodland. The most suitable uses are for wildlife food and cover areas, for watershed protection, and for recreational areas.

The small amount of soil between the stones and boulders may resemble a soil of any of several series, generally the Highfield, Dekalb, Chandler, or Edgemont soils. The rocks are all acid rocks and there is no limestone.

Stony rolling land (Sr).—This land is generally in forest and should remain so. Slopes range to as much as 35 percent. Although the land is not ideal for forests, some timber can be produced. High yields of timber cannot ordinarily be expected, however, and the growth of seedlings or young stock will be slow and the returns small. Deer and other wildlife find protection in these areas. Since most of the areas are in hilly or mountainous parts, well toward the heads of drainageways, they furnish watershed protection if they are forested. There are 4,643 acres, in capability unit VIIs–2.

Stony steep land (Ss).—Because this land is steep and rough, tree planting is not practicable, and production of timber will be slow. In addition, the land is so rough that little, if any, economic return from forest products can be expected. The most valuable uses of this land will be for wildlife and for watershed protection. The 2,857 acres are in capability unit VIIIs–1.

Talladega Series

The Talladega series consists of shallow, well-drained soils on highly micaceous schists. In Washington County, however, the Talladega soils are somewhat deeper than the average for the series elsewhere. They were developed in weathered mica schist covered by surface deposits of sandstone material that is probably colluvium from higher slopes. The Talladega soils occur in Washington County on intermediate and lower slopes and benches of South Mountain. Gravel is common in the light-colored surface layers of the soil, but it is absent from the lower subsoil and the substratum, which contain many flat fragments of schist or phyllite.

The Talladega soils are used in this county for a variety of crops. They appear to be especially desirable for berry crops and orchards because of their good position and air drainage.

Profile of Talladega gravelly silt loam, thick solum variant, 0 to 20 percent slopes, moderately eroded, in a forest just east of Moser Road, about nine-tenths of a mile south of its intersection with Alternate U.S. Highway No. 40:

A_1 0 to 2 inches: dark reddish-brown (5YR 2/2), light gravelly silt loam; moderate, fine, crumb structure; soft to slightly hard when dry, very friable when moist, and slightly plastic and slightly sticky when wet; roots matted; very strongly acid; abrupt, wavy to irregular boundary; horizon is 1 to 4 inches thick.

A_2 2 to 7 inches: yellowish-brown (10YR 5/4), light gravelly silt loam; weak, fine, crumb structure; moderately hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots plentiful; many fine and medium pores; very strongly acid; clear to abrupt, wavy boundary; horizon is 4 to 8 inches thick.

B_{21} 7 to 22 inches: weakly variegated yellowish-brown and yellowish-red (10YR 5/6 and 5YR 5/6), gravelly and somewhat channery, light silty clay loam; moderate, medium, blocky structure; hard when dry, friable to firm when moist, plastic and sticky when wet; roots rather few; many fine and some large pores; this appears to be a transition between the soil derived from sandstone or quartzite above and that part derived from phyllite below; has a somewhat greasy feel; contains considerable fine mica; very strongly acid; clear, wavy to irregular boundary; horizon is 12 to 20 inches thick.

B_{22} 22 to 30 inches: yellowish-red (2.5YR 5/8), channery, light silty clay loam; compound, very weak, coarse, platy and moderate to strong, medium, blocky structure; hard to very hard when dry, firm when moist, and plastic and sticky when wet; very few roots; many fine and medium pores; contains no angular gravel but many chips and fragments of phyllite and much finely divided mica; strongly acid; clear, irregular boundary; horizon is 6 to 15 inches thick.

C 30 to 42 inches +: marbled yellowish-red and reddish-yellow (5YR 5/8 and 7.5YR 6/6), decomposed phyllite of silty clay texture; inherited laminar structure; hard to very hard when dry, firm when moist, and plastic and sticky when wet; a few woody roots; contains considerable hard phyllite and an abundance of fine mica; strongly acid.

In some places the surface layer is a little more silty and contains less gravel than the one in the profile described. These less gravelly areas are usually at the lowest elevation. In wooded areas the A_2 horizon sometimes has a very faint or weak, platy structure. In eroded areas the light-colored surface material has been removed, and the exposed new surface is distinctly reddish.

Talladega gravelly silt loam, thick solum variant, 0 to 20 percent slopes, moderately eroded (TaC2).—This is the most extensive Talladega soil in the county. It has the profile that is described. Because the soil is highly susceptible to erosion and is, at best, only moder-

ately deep over bedrock, it is classified in capability unit IIIe–10. This means that it may be cultivated regularly, but only in fairly long rotations with very careful management to check erosion. This soil is well suited to orchards and berry crops. There are 794 acres in the county.

Talladega gravelly silt loam, thick solum variant, 10 to 20 percent slopes, severely eroded (TaC3).—This soil has been severely eroded and is no longer well suited to cultivation. An occasional tilled crop can be grown in rotation with hay or pasture plants, and the soil is suited to orchards if kept in sod or cover crops. There are 53 acres, in capability unit IVe–10.

Talladega gravelly silt loam, thick solum variant, 20 to 30 percent slopes (TaD).—There has been little erosion on this steep soil, since the areas of it have been exceptionally well managed or left in forest. The 160 acres could be cultivated occasionally, as long as the proper management is maintained. This soil is in capability unit IVe–10.

Talladega gravelly silt loam, thick solum variant, 20 to 45 percent slopes, moderately eroded (TaE2).—This soil is steep, and erosion has been active but not severe. The danger of further loss or damage is so great that the soil should not be cropped. If properly managed, it can be safely grazed. This soil occupies 111 acres and is in capability unit VIe–3.

Teas Series

The Teas series consists of somewhat excessively drained to excessively drained, shallow, skeletal soils that consist of materials weathered from dark-red to purplish-red sandstone and shale that is slightly limy in places. The Teas soils somewhat resemble the soils of the Calvin series, but they differ chiefly in being thinner and shallower and somewhat influenced by lime.

All the Teas soils of this county are in mapping units that are complexes of Litz and Teas soils. Litz soils make up between 50 and 60 percent of the complexes, and Teas soils the remainder.

Profile of Teas channery silt loam, 3 to 15 percent slopes, moderately eroded, in an orchard about one-half mile south of Ringgold:

A_p 0 to 6 inches: dark reddish-gray (5YR 4/2) channery silt loam; moderate, fine, crumb structure; slightly hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; coarse material is pinkish to purplish sandstone fragments and some shale; slightly acid; clear, smooth boundary; horizon is 4 to 6 inches thick.

B_2 6 to 11 inches: dark reddish-brown (5YR 3/2) shaly and very channery silt loam; very weak, fine to medium, subangular blocky structure; moderately hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots common; medium acid; gradual, wavy boundary; horizon is 5 to 10 inches thick.

C 11 to 20 inches: fairly soft to hard, pinkish and purplish shale and fine-grained sandstone fragments; infiltrated with about 10 to 15 percent fine material from the B_2 horizon above; very gradual to diffuse boundary; horizon is 3 to 12 inches thick.

D_r 20 inches +: hard purplish shale and sandstone, in places weakly calcareous below 30 inches.

Where the Teas soils blend into the Litz soils, the colors are more brownish than those described.

Terrace Escarpments

Throughout Washington County, wherever there are alluvial flood plains, there are some narrow and, as a rule, small areas of steep land made up of alluvium. These narrow strips are most commonly the sides of draws or small ravines that have been cut through the flood plains from adjacent uplands down to the main drainageways. In some other places, they are the short, sharp slopes from one level of a flood plain to another; for example, between a first bottom and a second bottom or low terrace. In still other places, they are at the edge of a flood plain where it adjoins steep or very steep uplands.

Although most of these areas are small, many of them are shown on the soil map. They may be made up of the soils of several series, including Congaree, Huntington, Lindside, Philo, Pope, or Warners. Although the soil materials thus vary considerably, these areas have one characteristic in common—they are all so steep and so subject to erosion that they require special care and management if they are cultivated.

Terrace escarpments (Te).—All of the areas just described have been included in this one mapping unit. Because of the danger of erosion, they have been placed in capability unit IIIe–6. The mapped areas amount to 341 acres. In most areas the slope is between 8 and 25 percent, but 36 acres have slopes greater than 25 percent. If all areas are treated and managed according to practices outlined for capability unit IIIe–6, they should be sufficiently protected for practical use in farming.

Thurmont Series

The Thurmont series consists of rather deep, well-drained soils that developed in deposits of colluvial rock debris. The rock debris contains a mixture of materials, chiefly greenstone or metabasalt, but it includes some sandstone and quartzite. The Thurmont soils occur on mountain slopes wherever fragmented rock material has accumulated, notably on foot slopes and on intermediate benchlike areas. They are in close association with the Braddock soils. Some undifferentiated areas of Braddock and Thurmont soils have been described under the Braddock series, but soils of the Thurmont series also occur by themselves.

The Thurmont soils are used for general crops, but they seem especially desirable for orchards and berry crops, chiefly because of the good air drainage in their side-slope positions. Some vegetables, such as tomatoes, are also grown on these soils.

Profile of Thurmont gravelly loam, 3 to 8 percent slopes, moderately eroded, in an apple orchard on Edgemont Road, about one-half mile south of the Pennsylvania State line:

A_p 0 to 8 inches: grayish-brown (10YR 5/2) heavy gravelly loam; moderate, fine, crumb structure; moderately hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; slightly acid; clear, smooth to wavy boundary; horizon is 5 to 8 inches thick.

B_{21} 8 to 15 inches: light yellowish-brown (10YR 6/4) gravelly silt loam; moderate, fine to medium, subangular blocky structure; moderately hard when dry, rather friable when moist, and sticky and moderately plas-

tic when wet; roots abundant; many fine and medium and some large pores; medium acid; gradual, wavy boundary; horizon is 6 to 10 inches thick.

B_{22} 15 to 31 inches: light yellowish-brown (10YR 6/4), gravelly, gritty, heavy silt loam; moderate, fine to medium, blocky structure; hard when dry, friable to firm when moist, moderately plastic and moderately sticky when wet; roots few; thick, nearly continuous, self-colored clay skins; medium to strongly acid; gradual, wavy to irregular boundary; horizon is 12 to 18 inches thick.

B_3 31 to 40 inches: light yellowish-brown (10YR 6/4), gravelly, very gritty silt loam; weak, medium, platy to weak, irregular, blocky structure; hard when dry, firm when moist, and sticky and moderately plastic when wet; roots few; some silt and clay coatings on aggregate surfaces; strongly acid; clear, irregular boundary; horizon is 8 to 12 inches thick.

C 40 to 48 inches +: brown (10YR 5/3), gravelly, extremely gritty loam; very slightly variegated with gray and yellow; very weak, medium to coarse, platy structure; hard when dry, firm when moist, and slightly plastic and slightly sticky when wet; practically no roots; very strongly acid.

Gravel consists mostly of greenstone or metabasalt, but in places there are many fragments of quartzite or sandstone. In some places the subsoil is a little more brown than the one described.

Thurmont gravelly loam, 3 to 8 percent slopes, moderately eroded (ThB2).—This soil has the profile that is described. Erosion has been active, but not very severe. The 460 acres are in capability unit IIe–4.

Thurmont gravelly loam, 8 to 15 percent slopes, moderately eroded (ThC2).—This soil occupies 245 acres. It is in capability unit IIIe–4.

Trego Series

The Trego series consists of moderately well drained soils on gravelly deposits of quartzite, sandstone, and metabasalt similar to those that were parent material for the Braddock and the Thurmont soils. The Trego soils are essentially red, like the Braddock soils, but they have a thick, platy fragipan in the lower subsoil that retards drainage somewhat. The Trego soils were named as gravelly silt loam, but small areas of silt loam and gravelly loam are present.

These soils are not extensive. They are used for general crops and for orchards, although some areas are in forest.

Profile of Trego gravelly silt loam, 3 to 15 percent slopes, moderately eroded, in a young second-growth forest area along old U.S. Highway No. 40, two-tenths of a mile west of its intersection with the new U.S. Highway No. 40, in the Mount Lena community:

A_{1p} 0 to 5 inches: dark-brown (10YR 3/3) gravelly silt loam; moderate, fine, crumb structure; slightly hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots fairly abundant; slightly acid; clear, smooth boundary; horizon is 4 to 6 inches thick.

A_2 5 to 11 inches: dark yellowish-brown (10YR 4/4) gravelly loam; compound, very weak, fine, platy and moderate, very fine, crumb to granular structure; slightly hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; roots rather plentiful; medium acid; gradual, wavy boundary; horizon is 5 to 10 inches thick.

B_1 11 to 21 inches: reddish-yellow (7.5YR 6/8), gravelly, gritty, heavy loam to light sandy clay loam; a few faint streaks of yellowish red (5YR 5/8); compound, weak, medium, platy and strong, fine to medium, irregular, blocky structure; moderately hard to hard and brittle when dry, moderately firm and brittle when moist, and moderately plastic and moderately sticky when wet; roots few; many fine and medium pores; very strongly acid; gradual, wavy boundary; horizon is 7 to 10 inches thick.

B_{21m} 21 to 29 inches: yellowish-red (5YR 5/8), gravelly, very gritty sandy clay loam; rather strongly streaked with reddish yellow (7.5YR 6/8); compound, moderate to strong, medium, platy and very irregular, blocky structure; hard and brittle when dry, firm and brittle when moist, and plastic and sticky when wet; practically no roots; very strongly acid; gradual to clear, wavy to irregular boundary; horizon is 6 to 12 inches thick.

B_{22m} 29 to 36 inches: red (2.5YR 4/8), gravelly, gritty, sandy clay loam; moderately streaked horizontally with yellowish brown and strong brown (10YR 5/6 and 7.5YR 5/6); compound, strong, medium, platy and strong, fine, irregular, blocky structure; very hard but brittle when dry, firm to very firm but brittle when moist, and plastic and sticky when wet; no roots; very strongly acid; clear to abrupt, wavy to broken boundary; horizon is 0 to 12 inches thick, being absent in some places.

C 36 to 48 inches +: pale-yellow (2.5YR 7/4) gravelly very fine sandy clay loam; a few horizontal streaks of reddish brown (5YR 5/4); weak, very coarse, platy structure; hard to very hard but brittle when dry, very firm but brittle when moist, and plastic but only slightly sticky when wet; no roots; very strongly to extremely acid.

The surface layer in some places is more reddish than the one described, and the subsoil is somewhat more yellowish. The thickness of all horizons and the grade of their structure are variable. The lower subsoil, or B_{22m} horizon, in many places is discontinuous. It is present in some places but absent in others. The Trego soils blend more or less gradually with the nonplaty Braddock and Thurmont soils.

Trego gravelly silt loam, 0 to 3 percent slopes (TrA).—These more or less level areas of the Trego soils, even though they are moderately well drained, tend to be wet at times because of their slow permeability. This wetness is more of a problem than erosion on the more level areas. The soil is, therefore, in capability unit IIw–1; there are 89 acres.

Trego gravelly silt loam, 3 to 15 percent slopes, moderately eroded (TrC2).—This soil has the profile that is described for the series. On these slopes there has been active erosion, and the erosion hazard is more critical than the drainage problem. The 252 acres are in capability unit IIIe–13.

Tyler Series

The Tyler series consists of poorly drained soils on old alluvial terraces that consist of materials washed originally from areas of soils on sandstone and shale. The Tyler soils occur on fairly smooth river and stream terraces in the western part of the county. On these same terraces are the moderately well drained Monongahela soils and the well drained, brown Holston and red Waynesboro soils. The fine-textured parent materials of the Tyler soils were deposited in quiet water or in slack water, and the soils have a very fine textured subsoil.

Tyler soils are very difficult to cultivate or plow when either slightly too wet or slightly too dry. However, most areas are used for late corn, but some are in pasture.

Profile of Tyler silt loam, in a once cultivated but now idle area, 1⅜ miles east of Orchard Ridge Road, on a terrace of Licking Creek:

A_p 0 to 5 inches: dark grayish-brown (2.5Y 4/2) silt loam; strong, fine, flattened, crumb or very fine, platy structure; moderately hard when dry, friable when moist, and moderately plastic and moderately sticky when wet; roots fairly abundant; very strongly to extremely acid; clear, smooth boundary; horizon is 5 to 6 inches thick.

B_{1g} 5 to 12 inches: pale-olive (5Y 6/3) fine silty clay loam; about 50 percent fine to medium, distinct mottles of grayish brown (2.5Y 5/2); compound, moderate, medium, platy and weak, fine, subangular blocky structure; hard when dry, somewhat firm and brittle when moist, and plastic and sticky when wet; few roots; very strongly to extremely acid; clear, smooth boundary; horizon is 6 to 10 inches thick.

B_{2g} 12 to 25 inches: olive-gray (5Y 5/2) fine clay loam; about 50 percent medium to coarse, prominent mottles of yellowish brown (10YR 5/8); compound, moderate, medium, platy and moderate, fine, blocky structure; very hard when dry, firm and brittle when moist, and plastic and sticky when wet; very few roots; extremely acid; clear, smooth boundary; horizon is 12 to 15 inches thick.

C_g 25 to 42 inches +: dark-gray (N 4/0, with a bluish cast) clay; 20 to 30 percent coarse, prominent mottles of yellowish brown (10YR 5/6); compound, very weak, coarse, platy and weak, medium, blocky structure; very hard when dry, firm but not brittle when moist, and sticky and plastic when wet; no visible roots or pores; extremely acid; several feet thick.

In some places the surface layer is more brownish than the one in the profile described, and the lower horizons are somewhat less fine textured and plastic.

Tyler silt loam, 0 to 8 percent slopes (TyB).—This is the only Tyler soil in the county. Because poor drainage and wetness are greater hindrances to use than the hazard of erosion, it is in capability unit IIIw–1. The area is 127 acres.

Warners Series

The Warners series consists of deep, dark-colored, very limy soils of the flood plains. The soils are made up of fine materials washed from areas of limestone rocks, and they are poorly drained to moderately well drained. The soils contain rather large accumulations of organic matter. The areas occupied by Warners soils were probably once swampy or ponded, but they have been filled in by deposits of soil until the surface is now well above the water level. On the same flood plains are soils of the Lindside, Melvin, and Dunning series, and, on some, soils of the Huntington series.

The Warners soils are moderately fertile and productive, but, because of their strong alkalinity, they may lack certain minor plant food elements, such as manganese, that are necessary for strong and healthy crops. The substrata of these soils are sometimes removed and used as sources of lime, leaving borrow pits or barren areas.

The Warners soils are used for hay, pasture, and corn, and, to a lesser extent, for other crops.

Profile of Warners loam, in a cultivated flood plain of West Branch of Marsh Run, about 100 yards north of State Road No. 60, in the Longmeadow community:

A_{1p} 0 to 8 inches: dark grayish-brown (10YR 4/2) loam; strong, medium, granular structure; moderately hard when dry, friable when moist, and sticky and moderately plastic when wet; roots abundant; numerous worm channels; moderately alkaline and slightly calcareous; gradual, smooth boundary; horizon is 7 to 10 inches thick.

A_{12} 8 to 38 inches: dark grayish-brown (2.5Y 4/2) loam; moderate, medium, granular structure; moderately hard to hard when dry, friable to somewhat firm when moist, and sticky and moderately plastic when wet; roots plentiful in upper part; many fine and medium pores and some worm channels; moderately alkaline and calcareous; clear to abrupt, wavy boundary; horizon is 24 to 36 inches thick.

C_{1g} 38 to 48 inches: pale-brown (10YR 6/3), shelly and fine, gravelly marl of variable texture but mostly clay loam; about 20 percent medium, distinct mottles of light gray (2.5Y 7/2); weak, medium, stratified structure; hard to very hard when dry, firm when moist, and very plastic and very sticky when wet; a few roots in upper part; mottling disappears on drying; moderately to strongly alkaline and strongly calcareous; clear to abrupt, wavy boundary; horizon is 6 to 12 inches thick.

C_{2g} 48 to 60 inches +: pale-brown (10YR 6/3) fine gravelly silty clay to clay; about 20 percent coarse, distinct mottles of dark brown (10YR 4/4); massive; hard when dry, firm when moist, and plastic and sticky when wet; no roots; less calcareous than C_{1g} horizon, containing few, if any, shells; moderately to strongly alkaline.

Undisturbed areas have a darker surface layer, and some cultivated areas have a lighter colored surface layer than the one described. Shells, mostly of fresh-water snails, are found within 24 inches of the surface, and, in some places, as close as 4 inches below the surface. There is some variation in drainage, and some wet areas could not be shown on the map.

Warners loam, 0 to 8 percent slopes (Wa).—This soil has the profile that is described. Because it is sometimes wet, and is subject to possible flooding, it is placed in capability unit IIw–7. There are 1,646 acres. A few areas may have frequent floods.

Waynesboro Series

The Waynesboro series consists of deep, well-drained, red soils on river terraces. The Waynesboro soils have been developed in very old alluvial deposits of materials that were washed originally from areas of acid rocks, mostly sandstone. In Washington County they are almost exclusively on high terraces of the Potomac River, where they are present along with soils of the Holston and Monongahela series.

Although the Waynesboro soils are very strongly acid or extremely acid, they are fairly productive if limed and properly managed. Large areas of Waynesboro soils are used for general crops and pasture, and some areas are in orchards.

Profile of Waynesboro gravelly loam, 0 to 3 percent slopes, in a forested area just off State Road No. 56, about 50 yards west of the entrance of Fort Frederick State Park:

A_1 0 to 3 inches: black (5YR 2/1) gravelly loam; weak to moderate, fine, granular structure; very slightly hard when dry, very friable when moist, and slightly plastic and slightly sticky when wet; roots abundant; very strongly acid; abrupt, wavy boundary; horizon is 2 to 4 inches thick.

A_2 3 to 8 inches: brown (10YR 5/3) gravelly loam; weak to moderate, fine, crumb structure; slightly hard when dry, friable when moist, and slightly plastic and

slightly sticky when wet; roots rather plentiful; many fine and medium and some large pores; very strongly acid; clear, wavy boundary; horizon is 4 to 6 inches thick.

B_{21} 8 to 14 inches: reddish-yellow (5YR 6/8), gravelly, heavy silt loam; moderate, medium, subangular blocky structure; moderately hard when dry, friable to firm when moist, and plastic and sticky when wet; roots few; many fine and medium pores; extremely acid; gradual, wavy boundary; horizon is 6 to 9 inches thick.

B_{22} 14 to 35 inches: red (2.5YR 5/8) gravelly silty clay loam or gravelly clay loam; very slightly variegated with lighter red in lower part; strong to very strong, medium, blocky structure; very hard when dry, firm when moist, and plastic and sticky when wet; very few roots; many fine and medium pores; self-colored, continuous clay skins in pores and on aggregate surfaces; extremely acid; clear, wavy boundary; horizon is 18 to 30 inches thick.

C 35 to 42 inches +: red (2.5YR 4/8) very gravelly sandy clay loam; stratified; moderately hard when dry, friable to firm when moist, and slightly plastic and slightly sticky when wet; no roots; moderately to moderately rapidly permeable; extremely acid.

Some spots are somewhat less gravelly than the soil described, and in some places the surface layer is somewhat more silty. In some places the soil is not so intensely red in the lower subsoil and substratum, but it is somewhat more yellowish or brownish. The yellow or brown color is most common where the Waynesboro soils grade to Holston soils.

Waynesboro gravelly loam, 0 to 3 percent slopes (WbA).—This soil has the profile that is described for the series. Because it is well drained, of good texture, and nearly level, it has no particular limitation for cultivated crops. Proper fertilizing and liming, along with general good management, are necessary for good yields of crops. The 166 acres are in capability unit I–4.

Waynesboro gravelly loam, 0 to 8 percent slopes, moderately eroded (WbB2).—Because of the danger of erosion, this soil is in capability unit IIe–4. There are 2,387 acres.

Waynesboro gravelly loam, 8 to 15 percent slopes, moderately eroded (WbC2).—On these slopes, practices and management to control erosion are needed. Long rotations should be used and contour tillage and other methods of erosion control carried out. The 1,490 acres are in capability unit IIIe–4.

Waynesboro gravelly loam, 3 to 15 percent slopes, severely eroded (WbC3).—Intense good management is needed on this soil to prevent further erosion. The soil occupies 475 acres and is in capability unit IIIe–44.

Waynesboro gravelly loam, 15 to 25 percent slopes, moderately eroded (WbD2).—This soil is steep enough so that there is great danger of erosion. It is in capability unit IVe–3. There are 236 acres.

Waynesboro gravelly loam, 15 to 25 percent slopes, severely eroded (WbD3).—On this soil, erosion has been severe. If the soil is carefully protected, it makes good hay land, permanent pasture, or orchards. The 322 acres are in capability unit VIe–2.

Waynesboro gravelly loam, 25 to 45 percent slopes, moderately eroded (WbE2).—This soil is too steep for safe cultivation. It can be grazed, however, if well sodded and managed. There are 98 acres, in capability unit VIe–2.

Waynesboro gravelly sandy loam, 0 to 8 percent slopes (WgB).—This soil has a profile like the one described for the series, except that it is more sandy throughout, especially in the surface layer. Droughtiness, because of the sand, is a more important management problem than the danger of erosion. For this reason, the 125 acres are in capability unit IIs–2.

Waynesboro gravelly sandy loam, 3 to 15 percent slopes, moderately eroded (WgC2).—Danger of erosion is more critical on this soil than the sandiness, but the sand also affects the management. There are 628 acres, in capability unit IIIe–5.

Waynesboro gravelly sandy loam, 8 to 15 percent slopes, severely eroded (WgC3).—The soil can be cultivated, but only occasionally and with special management. The 103 acres are in capability unit IVe–5.

Waynesboro gravelly sandy loam, 15 to 25 percent slopes, moderately eroded (WgD2).—The threat of erosion is great enough on this steep soil so that the soil is in capability unit IVe–5. There are 137 acres.

Wehadkee Series

The Wehadkee series consists of poorly drained, very acid soils of flood plains. The Wehadkee soils consist of fine materials that were washed originally from areas of soils on crystalline rocks. Most areas of Wehadkee soils in Washington County are in the southern part, on both sides of Elk Ridge. On the same bottom-land areas are the moderately well drained Chewacla soils and the well drained Congaree soils. Because they generally occur in narrow strips along smaller streams, many areas of Wehadkee soils have not been cleared. Some areas are used for corn, pasture, or natural meadow.

These soils are poorly drained and are very wet for long periods because of both impermeable substrata and a high water table. They are not extensive and are of little importance in agriculture.

Profile of Wehadkee silt loam, in a willow and alder thicket on the flood plain of Israel Creek, about 1 mile northwest of Gapland:

A_{11} 0 to 5 inches: dark grayish-brown (2.5Y 4/2) silt loam; weak, medium, crumb structure; hard when dry, friable to firm when moist, and slightly plastic and slightly sticky when wet; roots plentiful; strongly acid; clear, smooth boundary; horizon is 5 to 6 inches thick.

A_{12} 5 to 12 inches: dark yellowish-brown (10YR 4/4) silt loam; about 10 percent medium, faint specks of gray; weak, fine to medium, platy structure; very hard when dry, moderately firm and slightly brittle when moist, and moderately plastic and slightly sticky when wet; roots fairly plentiful; very strongly acid; clear to abrupt, smooth boundary; horizon is 6 to 8 inches thick.

B_{1g} 12 to 28 inches: light olive-brown (2.5Y 5/4), light silty clay loam; about 30 percent fine and medium, distinct mottles of strong brown (7.5YR 5/6) and of bluish gray; moderate, medium to coarse platy structure; very hard when dry, firm and rather brittle when moist, and plastic and sticky when wet; few roots; slowly permeable; very strongly acid; abrupt, wavy to irregular boundary; horizon is 12 to 30 inches thick.

D_g 28 to 36 inches +: variegated dark olive-gray (5Y 4/2) and bluish-green fine sandy clay; 5 to 10 percent fine, reddish-brown specks, and reddish-brown linings in the few old root channels; massive; very hard to extremely hard when dry, firm when moist, and sticky and very plastic when wet; very slowly permeable to extremely slowly permeable, bluish-green color fades completely to gray on drying; strongly acid.

The bluish-green color is not present everywhere in the substratum. Locally, there may be an overwash of very new material, some of it very thin, and most of it sandy.

Wehadkee silt loam (Wh).—This is the only Wehadkee soil mapped in the county. It is subject to occasional flooding, but, if the drainage is improved, fairly good yields of corn, hay, or pasture can be obtained. The 183 acres are in capability unit IIIw–1. A few areas are flooded frequently and should be maintained in permanent grass or woodland.

Westmoreland Series

The Westmoreland series consists of deep, well-drained soils developed in materials weathered from mixtures of acid and limy shale, with occasional inclusions of sandstone and hard, gray limestone. These materials generally occur in alternate bands across soil areas, with the shale, as a rule, in wide bands and the sandstone or limestone in fairly narrow bands. The Westmoreland soils are, therefore, somewhat variable in characteristics, particularly in the lower subsoil and the substratum. These soils are on nearly level to strongly sloping ridges in the western part of the county, generally along with soils of the Litz series.

The Westmoreland soils are not very extensive. They are very good agricultural soils and are used for nearly all crops, including orchards.

Profile of Westmoreland channery silt loam, 3 to 10 percent slopes, moderately eroded, in a forest just north of Tonoloway Creek Road, about 2 miles northwest of Hancock:

- A_1 0 to 2 inches: black (10YR 2/1), light channery silt loam; moderate, fine, crumb structure; soft when dry, very friable when moist, and nonplastic and nonsticky when wet; roots abundant; slightly acid; abrupt, wavy boundary; horizon is 2 to 3 inches thick.
- A_2 2 to 6 inches: grayish-brown (10YR 5/2), light channery silt loam; moderate, fine, granular structure; slightly hard when dry, very friable when moist, and slightly plastic and slightly sticky when wet; roots plentiful; medium acid; clear, wavy boundary; horizon is 3 to 5 inches thick.
- B_1 6 to 14 inches: brown (10YR 4/3), heavy channery silt loam; moderate, fine, blocky and subangular blocky structure; moderately hard when dry, friable or somewhat firm when moist, and moderately plastic and moderately sticky when wet; roots fairly plentiful; many fine and medium pores; medium acid; gradual, wavy boundary; horizon is 6 to 9 inches thick.
- B_2 14 to 32 inches: brown (7.5YR 5/4), shaly silty clay loam; moderate to strong, fine and medium, blocky and subangular blocky structure; moderately hard to hard when dry, friable to firm when moist, and plastic and sticky when wet; roots few; many fine and medium pores; thin, almost continuous, self-colored clay skins; medium to strongly acid; clear, wavy boundary; horizon is 12 to 20 inches thick.
- C 32 to 42 inches: strong-brown (7.5YR 5/6), very shaly loam or light silt loam; very weak, fine, blocky structure; moderately hard when dry, friable when moist, and slightly plastic and slightly sticky when wet; a few roots in upper part; about 40 percent shale; slightly to medium acid; gradual, irregular boundary; horizon is 6 to 15 inches thick.
- D_r 42 inches +: hard, slightly calcareous, brown shale.

In some places the surface layer contains few coarse fragments. In places where there is an underlying band of red sandstone, the subsoil and substratum are more reddish than those described. The Westmoreland soils generally grade to surrounding soils without sharp boundaries.

Westmoreland channery silt loam, 3 to 10 percent slopes, moderately eroded (WmB2).—This soil has the profile described. There is a hazard of erosion, and, because of it, the soil is placed in capability unit IIe–1. There are 311 acres.

Westmoreland channery silt loam, 10 to 20 percent slopes, moderately eroded (WmC2).—There is a strong threat of erosion on this soil, and it is placed in capability unit IIIe–1. There are 263 acres.

Westmoreland channery silt loam, 3 to 20 percent slopes, severely eroded (WmC3).—Erosion has damaged this soil so that it must be very carefully managed and protected if cultivation is to continue safely. A good use would be for sodded orchards. The 278 acres are in capability unit IVe–1.

Westmoreland channery silt loam, 20 to 30 percent slopes, moderately eroded (WmD2).—The slope of this soil is strong enough to cause severe risk of erosion if it is cultivated. The 82 acres are in capability unit IVe–1.

Westmoreland channery silt loam, 20 to 30 percent slopes, severely eroded (WmD3).—Erosion has been severe enough on this soil to make further cultivation impracticable. A better use would be permanent sod for pasture, or occasional hay crops. There are 100 acres, in capability unit VIe–1.

Estimated Yields

The soils of Washington County vary considerably in productivity. Some of them consistently produce high yields of the cultivated crops, and others are better suited to less intensive uses.

Table 5 shows, for the soils suitable for crops or pasture, the average estimated yields of specified crops under present management and under the improved management that is suggested for the different capability units in the next section of this report. These yields are averages for a normal 5-year period. In any given crop year, the yield of any crop may be more or less than the figure shown.

These estimates are based on information obtained from agricultural workers in the county and at the Maryland Agricultural Experiment Station, and from observations by farmers in the county.

The yields under improved management are not presumed to be the maximum obtainable. Yields from the same soils vary, depending on variations in management, weather, crop varieties, and diseases and insect pests.

Improved management includes some or many of these management practices:

1. Necessary conservation measures, which may include contour tillage, stripcropping, terracing, or contour furrowing; drainage; water control on both drained and undrained soils, especially disposal of excess water; and irrigation where needed and feasible.
2. Selection of varieties of crops suitable to the soil and the county.

3. Rotations of adequate length, generally including the following: A tilled crop to control weeds; a deep-rooted crop to improve permeability; one or more crops of legumes to maintain or improve fertility; and a close-growing crop or green-manure crop to improve structure and tilth, supply organic matter, and control erosion.

4. Return of manure and crop residues to the soil to supply nitrogen and other nutrients and to improve the physical characteristics of the soil.

5. Application of fertilizer and lime as indicated by soil tests. The county agent's office can be consulted about soil-testing services.

6. Suitable methods of plowing, preparing the seedbed, and cultivating.

7. Planting, cultivating, and harvesting at the proper time and in the proper way.

8. Control of weeds, diseases, and insects.

TABLE 5.—*Estimated average acre yields of specified crops under*

[In columns A are yields under present management; in columns B are yields under improved management. Where

Soil	Corn		Wheat		Barley	
	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Ashton fine sandy loam, 0 to 5 percent slopes	65	90	20	40	30	50
Atkins silt loam	35	60				
Benevola clay loam, 0 to 3 percent slopes	65	90	40	60	50	75
Benevola clay loam, 3 to 8 percent slopes, moderately eroded	60	85	35	55	45	65
Benevola clay loam, 8 to 15 percent slopes, moderately eroded	50	70	30	40	40	60
Benevola clay loam, 8 to 15 percent slopes, severely eroded	30	45	20	30	25	35
Berks channery loam, ridges, 0 to 10 percent slopes, moderately eroded	30	45	15	25	25	40
Berks channery loam, ridges, 10 to 20 percent slopes, moderately eroded	25	35	12	20	20	30
Berks channery loam, ridges, 10 to 20 percent slopes, severely eroded	15	25	10	15	15	20
Berks channery loam, ridges, 20 to 30 percent slopes, moderately eroded	15	25	10	15	15	20
Berks shaly silt loam, 0 to 8 percent slopes	35	60	18	25	30	40
Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded	30	50	15	22	25	35
Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded	25	40	15	22	20	30
Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded	18	28	12	17	17	25
Berks silt loam, ridges, 0 to 10 percent slopes, moderately eroded	30	50	15	22	25	35
Berks silt loam, ridges, 10 to 20 percent slopes, moderately eroded	25	40	15	22	20	30
Berks silt loam, ridges, 10 to 20 percent slopes, severely eroded	15	25	10	15	15	20
Berks silt loam, ridges, 20 to 30 percent slopes, moderately eroded	18	30	12	20	18	25
Braddock and Thurmont gravelly loams, 3 to 8 percent slopes, moderately eroded	35	60	20	28	30	45
Braddock and Thurmont gravelly loams, 8 to 15 percent slopes, moderately eroded	30	55	15	25	25	40
Braddock and Thurmont gravelly loams, 15 to 25 percent slopes	20	35	12	18	18	30
Brinkerton silt loam, 0 to 8 percent slopes	40	60				
Buchanan gravelly loam, 0 to 3 percent slopes	40	60	20	30	30	40
Buchanan gravelly loam, 3 to 8 percent slopes, moderately eroded	35	55	18	25	28	40
Buchanan gravelly loam, 8 to 15 percent slopes, moderately eroded	30	45	15	20	25	35
Buchanan gravelly loam, 15 to 25 percent slopes, moderately eroded	20	30	12	18	20	28
Calvin channery fine sandy loam, 3 to 10 percent slopes, moderately eroded	30	50	20	30	25	35
Calvin channery loam, 3 to 10 percent slopes, moderately eroded	30	50	20	30	25	35
Calvin channery loam, 10 to 20 percent slopes, moderately eroded	25	40	15	25	20	30
Calvin channery loam, 20 to 30 percent slopes	20	35	12	20	15	25
Calvin channery loam, 20 to 30 percent slopes, moderately eroded	18	25	10	15	15	20
Calvin channery loam, 30 to 45 percent slopes						
Calvin shaly loam, 0 to 10 percent slopes, moderately eroded	25	40	15	20	20	32
Calvin shaly loam, 10 to 20 percent slopes, moderately eroded	20	35	12	20	20	30
Calvin shaly loam, 10 to 20 percent slopes, severely eroded	15	22	10	15	15	20
Calvin shaly loam, 20 to 30 percent slopes	15	22	10	15	15	20
Calvin shaly loam, 30 to 45 percent slopes						
Calvin-Berks channery loams, 0 to 10 percent slopes, moderately eroded	30	50	20	30	25	35
Calvin-Berks channery loams, 10 to 20 percent slopes, moderately eroded	25	40	15	25	20	30
Calvin-Berks channery loams, 3 to 20 percent slopes, severely eroded	18	25	10	15	15	20
Calvin-Berks channery loams, 20 to 30 percent slopes, moderately eroded	18	25	10	15	15	20
Calvin-Montevallo shaly loams, 0 to 10 percent slopes, moderately eroded	25	40	15	20	20	32
Calvin-Montevallo shaly loams, 10 to 20 percent slopes, moderately eroded	20	35	12	20	20	30
Calvin-Montevallo shaly loams, 20 to 30 percent slopes, moderately eroded	15	22	10	15	15	20
Chandler silt loam and channery silt loam, 0 to 10 percent slopes	30	45	17	25	25	35
Chandler silt loam and channery silt loam, 3 to 10 percent slopes, moderately eroded	25	40	15	22	22	32
Chandler silt loam and channery silt loam, 10 to 20 percent slopes, moderately eroded	20	30	12	20	20	30
Chandler silt loam and channery silt loam, 20 to 30 percent slopes						
Chewacla gravelly sandy loam	35	65				
Chewacla silt loam	45	75				
Chewacla stony silt loam						
Congaree silt loam and gravelly loam	60	90				
Corydon clay loam, 0 to 3 percent slopes	55	95	30	50	40	60
Corydon clay loam, 3 to 8 percent slopes, moderately eroded	50	85	25	45	35	55
Corydon clay loam, 8 to 15 percent slopes, moderately eroded	40	75	22	35	32	50
Corydon extremely rocky clay loam, 0 to 15 percent slopes						
Corydon very rocky clay loam, 3 to 45 percent slopes, moderately eroded						
Duffield silt loam, 0 to 3 percent slopes	70	100	40	60	55	80
Duffield silt loam, 3 to 8 percent slopes, moderately eroded	65	95	35	50	45	70
Duffield silt loam, 8 to 15 percent slopes, moderately eroded	55	85	30	45	40	60
Duffield silt loam, 8 to 25 percent slopes, severely eroded	30	55	20	30	25	40
Duffield silt loam, 15 to 25 percent slopes, moderately eroded	40	65	25	35	30	45
Duffield very rocky silt loam, 3 to 15 percent slopes						
Duffield very rocky silt loam, 8 to 45 percent slopes, moderately eroded						
Dunmore cherty silt loam, 3 to 8 percent slopes, moderately eroded	55	85	30	45	40	60
Dunmore cherty silt loam, 8 to 15 percent slopes, moderately eroded	45	75	25	35	30	50

See footnotes at end of table.

two levels of management on the soils suitable for crops or pasture

yields are not given, either the soil is not suitable for that crop or there is no information on which to base an estimate]

Oats		Alfalfa		Clover and mixed hay		Apples		Peaches		Prunes and plums		Cherries [1]		Pasture (cow-acre-days) [2]	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Lb.*	*Lb.*		
35	60	2.8	5.2	1.7	3.0									100	175
				1.2	2.0									70	100
50	70	3.6	5.6	2.5	3.3									150	190
40	60	3.2	4.6	2.4	3.2									140	175
35	55	3.0	4.2	2.0	3.0									120	150
25	35	2.0	2.6	1.2	1.8									95	120
25	40	1.8	2.4	1.2	1.6	120	180	90	135	105	150	60	90	60	95
15	25	1.4	2.2	1.0	1.4	100	150	75	115	90	135	50	75	50	85
15	20	1.2	1.8	.6	1.0	70	100	55	75	65	90	35	50	40	60
15	20	1.2	1.8	.6	1.0	70	100	55	75	65	90	35	50	40	60
25	40	2.0	2.6	1.2	1.7	130	190	95	140	110	160	65	95	70	100
25	35	1.8	2.6	1.1	1.7	120	180	90	135	105	150	60	90	65	95
20	30	1.8	2.6	1.1	1.5	110	170	85	125	95	140	55	85	60	90
17	25	1.4	2.0	.8	1.3	90	140	70	100	80	115	45	70	45	75
25	35	1.8	2.6	1.1	1.7	120	180	90	135	105	150	60	90	65	95
20	30	1.6	2.4	1.0	1.4	100	150	75	110	80	115	50	80	55	85
15	20	1.2	1.8	.6	1.0	70	100	55	75	65	90	35	50	40	60
18	25	1.4	2.0	.7	1.1	80	110	60	85	70	95	40	55	45	75
30	45	2.2	3.6	1.4	2.3	150	200	110	150	130	175	75	100	80	110
25	40	2.0	2.8	1.2	2.0	120	170	90	125	105	145	60	85	60	90
15	25	1.4	2.4	.8	1.4	90	140	65	100	75	115	45	70	40	70
				1.2	2.0									70	100
				1.4	2.2									85	110
				1.3	2.0									75	105
				1.1	1.6									65	90
				.9	1.3									55	80
25	35	2.0	2.8	1.3	2.0	150	200	110	150	130	175	75	100	70	100
25	35	2.0	2.8	1.3	2.0	125	175	95	135	110	155	65	90	60	90
15	25	1.5	2.3	1.0	1.5	100	150	75	115	90	135	50	75	50	80
15	22	1.2	2.0	.7	1.1	80	120	60	90	70	105	40	60	45	70
15	20	1.0	1.8	.6	1.0	70	100	55	80	65	90	35	50	40	60
														35	60
18	30	1.6	2.4	1.1	1.5	110	160	80	120	95	140	55	80	60	85
15	25	1.4	2.2	1.0	1.4	100	150	75	115	90	135	50	75	50	80
15	20	1.2	1.8	.6	1.0	70	100	55	80	65	90	35	50	40	60
15	20	1.2	1.8	.6	1.0	70	100	55	80	65	90	35	50	40	60
														35	60
25	35	2.0	2.8	1.3	2.0	125	175	95	135	110	155	65	90	60	90
15	25	1.5	2.3	1.0	1.5	100	150	75	115	90	135	50	75	50	80
15	20	1.0	1.8	.6	1.0	70	100	55	80	65	90	35	50	40	60
15	20	1.0	1.8	.6	1.0	70	100	55	80	65	90	35	50	40	60
18	30	1.6	2.4	1.1	1.5	110	160	80	120	95	140	55	80	60	85
15	25	1.4	2.2	1.0	1.4	100	150	75	115	90	135	50	75	50	80
15	20	1.2	1.8	.6	1.0	70	100	55	80	65	90	35	50	40	60
25	35	2.0	2.6	1.1	1.7	120	170	90	125	105	150	60	85	60	90
20	30	1.6	2.4	1.0	1.6	110	160	85	120	95	140	55	80	55	80
18	25	1.4	2.2	.9	1.5	100	150	75	115	90	135	50	75	45	70
														40	60
														75	110
														100	150
														85	130
				2.0	2.6									150	185
40	55	2.8	4.4	2.0	2.7									120	150
35	50	2.6	3.8	1.9	2.6									110	140
30	45	2.4	3.4	1.6	2.4									95	120
														50	85
														75	110
60	80	3.6	5.6	2.6	3.4									150	190
45	70	3.2	4.6	2.3	3.2									140	175
40	60	3.0	4.2	2.2	3.0									120	150
25	40	2.2	3.0	1.5	2.3									80	120
30	45	2.6	3.6	1.7	2.5									100	135
														100	140
														85	125
40	60	3.0	4.4	2.2	3.0	180	260	135	195	155	225	90	130	110	150
30	50	2.4	3.6	1.8	2.4	140	210	105	155	125	180	70	105	90	120

TABLE 5.—*Estimated average acre yields of specified crops under two*

[In columns A are yields under present management; in columns B are yields under improved management. Where

Soil	Corn		Wheat		Barley	
	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Dunning and Melvin silty clay loams	45	80				
Edgemont and Laidig channery loams, 0 to 12 percent slopes	35	50	17	25	30	40
Edgemont and Laidig channery loams, 5 to 20 percent slopes, moderately eroded	30	45	15	22	25	35
Edgemont and Laidig channery loams, 20 to 35 percent slopes, moderately eroded	25	35	12	18	20	30
Edgemont and Laidig channery loams, 35 to 60 percent slopes, moderately eroded						
Edgemont and Laidig very stony loams, 0 to 5 percent slopes						
Edgemont and Laidig very stony loams, 5 to 35 percent slopes						
Elliber cherty loam, 5 to 12 percent slopes, moderately eroded	40	65	25	35	35	50
Elliber cherty loam, 12 to 25 percent slopes, moderately eroded	35	55	20	30	30	40
Elliber cherty loam, 25 to 45 percent slopes, moderately eroded	25	40	12	18	20	30
Etowah gravelly loam, 0 to 3 percent slopes	65	90	40	55	50	70
Etowah gravelly loam, 3 to 8 percent slopes, moderately eroded	55	80	35	50	40	60
Etowah gravelly loam, 8 to 15 percent slopes, moderately eroded	45	70	25	40	35	55
Etowah gravelly loam, 15 to 25 percent slopes, moderately eroded	35	60	20	35	30	45
Etowah silt loam, 0 to 3 percent slopes	65	90	40	55	50	70
Etowah silt loam, 3 to 8 percent slopes, moderately eroded	55	80	35	50	40	60
Etowah silt loam, 8 to 15 percent slopes, moderately eroded	45	70	25	40	35	55
Fauquier channery loam, 0 to 5 percent slopes	60	80	30	40	40	60
Fauquier channery loam, 5 to 10 percent slopes, moderately eroded	50	70	25	35	35	50
Fauquier channery loam, 10 to 20 percent slopes, moderately eroded	40	60	20	30	30	45
Fauquier channery loam, 20 to 35 percent slopes, moderately eroded	30	50	17	25	25	35
Fauquier silt loam, 0 to 3 percent slopes	60	80	30	40	40	60
Fauquier silt loam, 3 to 10 percent slopes, moderately eroded	50	70	25	35	35	50
Fauquier silt loam, 10 to 20 percent slopes, moderately eroded	40	60	20	30	30	45
Fauquier silt loam, shallow, 3 to 20 percent slopes, moderately eroded	22	35	15	20	20	30
Fauquier very stony loam, 5 to 35 percent slopes						
Frankstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded						
Frankstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded						
Frankstown and Duffield channery silt loams, 0 to 3 percent slopes	65	95	40	50	55	75
Frankstown and Duffield channery silt loams, 3 to 8 percent slopes, moderately eroded	60	90	35	45	45	65
Frankstown and Duffield channery silt loams, 0 to 8 percent slopes, severely eroded	45	70	25	35	35	50
Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, moderately eroded	50	75	30	40	40	60
Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, severely eroded	35	55	18	25	25	40
Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, moderately eroded	35	60	20	30	30	45
Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, severely eroded						
Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, moderately eroded						
Frederick cherty silt loam, 0 to 8 percent slopes, moderately eroded	50	75	30	45	40	60
Frederick cherty silt loam, 8 to 15 percent slopes, moderately eroded	40	65	25	35	35	50
Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded	30	50	18	25	25	35
Frederick cherty silt loam, 15 to 25 percent slopes, moderately eroded	35	55	20	30	30	40
Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded						
Frederick cherty silt loam, 25 to 45 percent slopes, moderately eroded						
Hagerstown clay loam, 0 to 3 percent slopes	65	95	40	60	50	75
Hagerstown clay loam, 0 to 8 percent slopes, moderately eroded	60	90	35	55	45	65
Hagerstown clay loam, 3 to 8 percent slopes, severely eroded	45	70	25	35	35	50
Hagerstown clay loam, 8 to 15 percent slopes, moderately eroded	55	80	25	40	40	60
Hagerstown clay loam, 8 to 15 percent slopes, severely eroded	35	55	20	25	25	40
Hagerstown clay loam, 15 to 25 percent slopes, moderately eroded	40	65	20	30	30	45
Hagerstown clay loam, 15 to 25 percent slopes, severely eroded						
Hagerstown silt loam, 0 to 3 percent slopes	70	100	40	60	50	75
Hagerstown silt loam, 0 to 8 percent slopes, moderately eroded	65	95	35	55	45	65
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded	55	85	25	40	40	60
Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded	40	65	20	30	30	45
Hagerstown silty clay loam, 0 to 3 percent slopes	70	100	40	60	50	75
Hagerstown silty clay loam, 0 to 8 percent slopes, moderately eroded	65	95	35	55	45	65
Hagerstown silty clay loam, 8 to 15 percent slopes, moderately eroded	55	85	25	40	40	60
Hagerstown silty clay loam, 15 to 25 percent slopes, moderately eroded	40	65	20	30	30	45
Hagerstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded						
Hagerstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded						
Hagerstown very rocky silty clay loam, 3 to 15 percent slopes, moderately eroded						
Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded						
Hagerstown very rocky silty clay loam, 15 to 45 percent slopes, moderately eroded						
Hagerstown, Corydon, and Duffield very rocky silt loams, 0 to 3 percent slopes						
Hagerstown and Duffield silt loams, 25 to 45 percent slopes, moderately eroded						
Hazel channery silt loam, 0 to 10 percent slopes, moderately eroded	20	30	15	20	17	23
Hazel channery silt loam, 10 to 20 percent slopes, moderately eroded	15	25	10	15	15	20

See footnotes at end of table.

levels of management on the soils suitable for crops or pasture—Continued

yields are not given, either the soil is not suitable for that crop or there is no information on which to base an estimate]

Oats		Alfalfa		Clover and mixed hay		Apples		Peaches		Prunes and plums		Cherries [1]		Pasture (cow-acre-days) [2]	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Lb.*	*Lb.*		
				1.5	2.8									90	150
30	40	2.2	3.2	1.3	2.0	130	180	95	135	110	155	65	90	70	100
25	35	2.0	2.8	1.2	1.8	120	170	90	125	105	150	60	85	60	90
20	30	1.4	2.4	.9	1.4	90	140	70	105	85	130	45	70	40	70
														30	50
														60	90
														30	50
35	50	2.4	3.6	1.9	2.5	150	240	110	180	130	210	75	120	85	120
30	40	1.6	3.0	1.4	2.2	130	200	95	150	115	175	65	100	65	95
20	30			1.0	1.5	100	150	75	110	85	130	50	75	40	70
50	70	3.2	4.6	2.3	3.0									150	190
40	60	3.0	4.0	2.0	2.9	180	260	135	195	160	230	90	130	135	170
35	55	2.8	3.8	1.8	2.6	140	240	105	180	120	210	70	120	120	150
30	45	2.2	3.2	1.4	2.1	110	190	80	140	95	165	55	95	95	120
50	70	3.2	4.6	2.3	3.0									150	190
40	60	3.0	4.0	2.0	2.9	180	260	135	195	160	230	90	130	135	170
35	55	2.8	3.8	1.8	2.6	140	240	105	180	120	210	70	120	120	150
40	60	3.6	4.6	2.2	3.0									135	170
35	55	3.2	4.0	1.9	2.7	180	260	135	195	160	230	90	130	125	160
30	50	3.0	4.0	1.8	2.4	140	240	105	180	125	200	70	120	115	145
25	35	2.6	3.6	1.6	2.1	110	190	80	145	95	165	55	95	75	100
40	60	3.6	4.6	2.2	3.0									135	170
35	50	3.2	4.0	1.9	2.7	180	260	135	195	160	230	90	130	125	160
30	50	3.0	4.0	1.8	2.4	140	240	105	180	125	200	70	120	115	145
20	30			1.3	1.8	100	170	75	120	85	140	50	85	60	85
														55	80
														100	140
														75	110
50	70	3.4	5.4	2.4	3.2									150	185
40	60	3.2	4.6	2.3	3.0									140	170
30	50	2.6	3.8	1.8	2.6									110	140
35	55	3.0	4.2	2.0	2.8									120	150
25	40	2.0	2.8	1.4	2.2									90	120
30	45	2.4	3.2	1.6	2.4									100	135
														65	95
														70	105
40	60	3.0	4.4	2.2	3.0	180	260	135	195	155	230	90	130	110	150
35	50	2.4	3.6	1.9	2.5	150	240	105	180	125	210	75	120	85	120
25	35	1.4	2.4	1.2	2.0	110	180	80	120	95	150	55	90	55	90
30	40	1.6	3.0	1.4	2.2	130	210	90	150	110	180	65	100	65	100
														50	70
														55	80
50	70	3.6	5.6	2.5	3.3									150	190
40	60	3.2	4.6	2.4	3.2									140	175
35	50	2.6	3.8	1.8	2.6									110	140
35	55	3.0	4.2	2.0	3.0									120	150
25	40	2.0	2.8	1.4	2.2									90	120
30	45	2.4	3.2	1.7	2.4									100	130
														70	100
50	75	3.6	5.6	2.5	3.3									150	190
40	60	3.2	4.6	2.4	3.2									140	175
35	55	3.0	4.2	2.0	3.0									120	150
30	45	2.4	3.2	1.7	2.4									100	130
50	75	3.6	5.6	2.5	3.3									150	190
40	60	3.2	4.6	2.4	3.2									140	175
35	55	3.0	4.2	2.0	3.0									120	150
30	45	2.4	3.2	1.7	2.4									100	130
														100	140
														85	125
														100	140
														75	110
														85	125
														110	160
														90	125
17	23			.7	1.2	75	110	55	85	65	95	40	60	50	75
15	20			.6	1.0	70	100	50	75	60	85	35	50	40	60

TABLE 5.—*Estimated average acre yields of specified crops under two*

[In columns A are yields under present management; in columns B are yields under improved management. Where

Soil	Corn		Wheat		Barley	
	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Hazel channery silt loam, 10 to 20 percent slopes, severely eroded			6	10	10	15
Hazel channery silt loam, 20 to 30 percent slopes, moderately eroded	10	15	8	12	12	17
Highfield gravelly loam, 0 to 5 percent slopes	50	75	25	35	40	55
Highfield gravelly loam, 5 to 10 percent slopes, moderately eroded	45	70	22	32	35	45
Highfield gravelly loam, 10 to 20 percent slopes, moderately eroded	35	55	20	27	30	40
Highfield gravelly loam, 20 to 35 percent slopes, moderately eroded	25	45	15	22	20	30
Highfield very stony loam, 0 to 5 percent slopes						
Highfield very stony loam, 5 to 30 percent slopes						
Holston gravelly loam, 0 to 3 percent slopes	45	70	25	35	35	50
Holston gravelly loam, 0 to 8 percent slopes, moderately eroded	40	65	25	35	30	45
Holston gravelly loam, 8 to 15 percent slopes, moderately eroded	35	55	20	28	25	35
Holston gravelly loam, 8 to 25 percent slopes, severely eroded						
Holston gravelly loam, 15 to 25 percent slopes, moderately eroded	30	50	17	22	22	32
Holston gravelly loam, 25 to 45 percent slopes, moderately eroded						
Holston gravelly sandy loam, 3 to 8 percent slopes	35	55	15	25	30	40
Holston gravelly sandy loam, 3 to 15 percent slopes, moderately eroded	25	40	12	20	20	30
Holston gravelly sandy loam, 8 to 15 percent slopes, severely eroded	18	30	10	15	15	20
Holston silt loam, 0 to 3 percent slopes	45	70	25	35	35	50
Holston silt loam, 3 to 8 percent slopes, moderately eroded	40	65	25	35	30	45
Holston silt loam, 8 to 15 percent slopes, moderately eroded	35	55	20	28	25	35
Huntington fine sandy loam	65	100	30	40	40	55
Huntington gravelly loam	70	110	30	40	40	55
Huntington silt loam	70	110	30	40	40	55
Huntington silt loam, local alluvium	75	115	40	60	55	75
Laidig gravelly loam, 0 to 3 percent slopes	35	60	18	28	30	45
Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded	32	55	15	25	28	40
Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded	30	50	12	20	25	35
Laidig gravelly loam, 15 to 25 percent slopes, moderately eroded	25	40	10	17	20	30
Laidig very stony loam, 8 to 25 percent slopes						
Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded	40	65	25	35	35	45
Landisburg cherty silt loam, 8 to 25 percent slopes, moderately eroded	35	55	20	30	30	40
Largent silt loam	45	75				
Leadvale gravelly silt loam, 0 to 3 percent slopes	40	70	20	30	30	40
Leadvale gravelly silt loam, 3 to 8 percent slopes, moderately eroded	35	55	15	25	25	35
Lindside silt loam	50	80				
Lindside silt loam, local alluvium	55	90	20	30	30	40
Litz channery loam, 3 to 10 percent slopes, moderately eroded	30	55	18	25	25	35
Litz channery loam, 10 to 20 percent slopes, moderately eroded	25	45	15	22	22	32
Litz channery loam, 10 to 20 percent slopes, severely eroded	20	35	12	20	18	25
Litz shaly loam, 0 to 10 percent slopes	30	50	18	25	25	35
Litz shaly loam, 3 to 10 percent slopes, moderately eroded	28	45	18	25	25	35
Litz shaly loam, 10 to 20 percent slopes, moderately eroded	25	40	15	22	22	32
Litz shaly loam, 10 to 20 percent slopes, severely eroded	20	30	12	20	18	25
Litz shaly loam, 20 to 30 percent slopes, moderately eroded	20	30	12	20	18	25
Litz shaly loam, 20 to 30 percent slopes, severely eroded						
Litz shaly loam, 30 to 45 percent slopes, moderately eroded						
Litz-Teas channery silt loams, 0 to 8 percent slopes	30	55	20	30	25	35
Litz-Teas channery silt loams, 3 to 15 percent slopes, moderately eroded	25	45	15	25	22	35
Litz-Teas channery silt loams, 8 to 15 percent slopes, severely eroded	20	30	12	20	18	28
Litz-Teas channery silt loams, 15 to 25 percent slopes, moderately eroded	20	35	12	20	18	30
Litz-Teas channery silt loams, 15 to 25 percent slopes, severely eroded						
Litz-Teas channery silt loams, 25 to 45 percent slopes, moderately eroded						
Melvin silt loam	40	70				
Monongahela gravelly loam, 3 to 8 percent slopes, moderately eroded	35	55	15	25	25	35
Monongahela gravelly loam, 8 to 15 percent slopes, moderately eroded	30	45	15	25	20	30
Monongahela silt loam, 0 to 3 percent slopes	40	60	20	30	30	45
Monongahela silt loam, 3 to 8 percent slopes, moderately eroded	35	55	15	25	25	35
Monongahela silt loam, 8 to 15 percent slopes, moderately eroded	30	45	15	25	20	30
Monongahela silt loam, 15 to 25 percent slopes, moderately eroded	25	40	12	20	15	25
Montevallo shaly loam, 0 to 10 percent slopes, moderately eroded	25	40	12	20	20	30
Montevallo shaly loam, 10 to 20 percent slopes, moderately eroded	20	35	12	20	18	25
Montevallo shaly loam, 10 to 20 percent slopes, severely eroded						
Montevallo shaly loam, 20 to 30 percent slopes, moderately eroded						

See footnotes at end of table.

levels of management on the soils suitable for crops or pasture—Continued

yields are not given, either the soil is not suitable for that crop or there is no information on which to base an estimate]

Oats		Alfalfa		Clover and mixed hay		Apples		Peaches		Prunes and plums		Cherries [1]		Pasture (cow-acre-days) [2]	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Lb.*	*Lb.*		
10	15			0. 5	0. 8									25	40
12	17			. 5	. 9	60	80	45	60	50	70	30	40	30	45
35	55	3. 2	4. 0	1. 9	2. 7	180	260	135	195	160	230	90	130	120	145
30	45	3. 0	3. 8	1. 8	2. 6	140	240	105	180	125	210	70	120	100	125
30	40	2. 6	3. 4	1. 5	2. 3	120	170	90	125	105	150	60	85	80	100
20	30	2. 2	3. 0	1. 2	2. 0	110	160	80	120	95	140	55	80	60	80
														75	100
														55	75
35	50	2. 8	3. 8	1. 7	2. 4	170	240	125	180	150	210	85	120	100	135
30	45	2. 6	3. 2	1. 5	2. 2	140	210	105	155	125	180	70	105	90	125
25	40	2. 4	3. 0	1. 3	1. 9	130	180	95	135	115	160	65	90	75	105
														55	80
22	35	2. 0	2. 8	1. 2	1. 7	120	170	90	125	105	145	60	85	65	90
														60	85
30	40	2. 2	3. 2	1. 3	2. 0	130	180	95	135	110	155	65	90	70	100
20	30	1. 8	2. 6	1. 1	1. 6	90	130	70	110	80	120	45	65	50	80
15	20			. 6	1. 0	70	100	50	75	60	85	35	50	40	60
35	50	2. 8	3. 8	1. 7	2. 4	170	240	125	180	150	210	85	120	100	135
30	45	2. 6	3. 2	1. 5	2. 2	140	210	105	155	125	180	70	105	90	125
25	40	2. 4	3. 0	1. 3	1. 9	130	180	95	135	115	160	65	90	75	105
40	55	2. 4	3. 6	2. 0	2. 6									135	175
40	55	2. 4	3. 6	2. 2	3. 0									150	190
40	55	2. 4	3. 6	2. 2	3. 0									160	190
60	80	3. 4	5. 4	2. 5	3. 5									160	200
30	45	2. 4	3. 4	1. 4	2. 2	130	180	95	135	115	160	65	90	75	110
28	40	2. 2	3. 2	1. 3	2. 0	130	180	95	135	115	160	65	90	70	100
25	35	2. 0	2. 8	1. 2	1. 8	120	170	90	125	105	150	60	85	60	90
20		1. 4	2. 4	. 9	1. 4	90	140	65	105	80	120	45	70	45	70
														35	55
35	45			1. 8	2. 6									70	100
30	40			1. 4	2. 2									60	90
														100	150
				1. 4	2. 2									80	115
				1. 2	1. 8									70	100
				1. 8	2. 7									130	165
30	40			2. 0	3. 0									130	170
25	35	2. 0	2. 8	1. 3	1. 8	140	190	105	140	120	165	70	95	70	100
20	32	1. 6	2. 6	1. 2	1. 7	120	170	90	125	105	150	60	85	60	90
18	25			1. 0	1. 4	100	150	75	110	85	125	50	75	50	75
25	35	2. 0	2. 8	1. 3	1. 8	140	190	105	140	120	165	70	95	70	100
25	35	2. 0	2. 8	1. 3	1. 8	140	190	105	140	120	165	70	95	65	95
20	32	1. 6	2. 6	1. 2	1. 7	120	170	90	125	105	150	60	85	60	90
18	25			1. 0	1. 4	100	150	75	110	85	125	50	75	50	75
18	25	1. 4	2. 2	1. 0	1. 4	100	150	75	110	85	125	50	75	55	80
														35	60
														40	65
25	35	2. 0	2. 8	1. 3	1. 8	140	190	105	145	120	175	70	95	70	100
20	30	1. 6	2. 6	1. 2	1. 7	120	170	90	125	105	150	60	85	60	90
15	25			1. 0	1. 4	100	150	75	110	85	125	50	75	50	75
15	25	1. 4	2. 2	1. 0	1. 4	100	150	75	110	85	125	50	75	50	80
														30	55
														40	60
				1. 5	2. 8									85	140
				1. 5	2. 3									70	100
				1. 2	1. 8									60	90
				1. 5	2. 5									80	120
				1. 5	2. 3									70	100
				1. 2	1. 8									60	90
				1. 0	1. 4									50	85
15	25	1. 4	2. 2	1. 0	1. 4	100	150	75	115	90	135	50	75	50	80
18	25	1. 3	2. 0	. 8	1. 2	85	125	65	95	80	115	40	65	45	75
														35	65
														40	70

TABLE 5.—*Estimated average acre yields of specified crops under two*

[In columns A are yields under present management; in columns B are yields under improved management. Where

Soil	Corn		Wheat		Barley	
	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Murrill gravelly loam, 0 to 3 percent slopes	60	95	35	50	40	60
Murrill gravelly loam, 0 to 8 percent slopes, moderately eroded	50	85	25	40	35	55
Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded	40	70	20	35	30	45
Murrill gravelly loam, 8 to 25 percent slopes, severely eroded						
Murrill gravelly loam, 15 to 25 percent slopes, moderately eroded	35	60	15	25	25	40
Murrill gravelly loam, 25 to 45 percent slopes, moderately eroded						
Murrill gravelly sandy loam, 0 to 8 percent slopes	35	55	20	30	30	40
Murrill gravelly sandy loam, 3 to 15 percent slopes, moderately eroded	30	50	15	25	25	35
Murrill gravelly sandy loam, 8 to 15 percent slopes, severely eroded	22	40	12	20	20	30
Murrill gravelly sandy loam, 15 to 25 percent slopes, moderately eroded	22	40	12	20	20	30
Murrill gravelly sandy loam, 15 to 25 percent slopes, severely eroded						
Murrill silt loam, 0 to 3 percent slopes	60	95	35	50	40	60
Murrill silt loam, 0 to 8 percent slopes, moderately eroded	50	85	25	40	35	55
Murrill silt loam, 8 to 15 percent slopes, moderately eroded	40	70	20	35	30	45
Myersville channery loam, 0 to 3 percent slopes	60	95	30	40	40	60
Myersville channery loam, 3 to 10 percent slopes, moderately eroded	55	90	25	35	35	50
Myersville channery loam, 10 to 20 percent slopes, moderately eroded	45	80	20	30	30	45
Myersville channery loam, 20 to 30 percent slopes, moderately eroded	30	55	18	25	25	32
Myersville channery loam, 30 to 45 percent slopes, moderately eroded						
Myersville channery silt loam, 3 to 10 percent slopes, severely eroded	35	60	18	25	25	35
Myersville channery silt loam, 10 to 30 percent slopes, severely eroded						
Myersville silt loam, 0 to 3 percent slopes	60	95	30	40	40	60
Myersville silt loam, 3 to 10 percent slopes, moderately eroded	55	90	25	35	35	50
Myersville silt loam, 10 to 20 percent slopes, moderately eroded	45	80	20	30	30	45
Myersville very stony loam, 3 to 30 percent slopes, moderately eroded						
Philo gravelly sandy loam	35	65				
Philo silt loam	45	75				
Pope fine sandy loam	60	90	25	35	35	50
Pope gravelly loam	60	90	25	35	35	50
Pope gravelly sandy loam	45	75	20	30	30	45
Pope silt loam	60	90	25	35	35	50
Pope stony gravelly loam						
Rohrersville silty clay loam, 0 to 8 percent slopes, moderately eroded	50	80	20	30	30	45
Talladega gravelly silt loam, thick solum variant, 0 to 20 percent slopes, moderately eroded	30	45	15	22	22	35
Talladega gravelly silt loam, thick solum variant, 10 to 20 percent slopes, severely eroded	20	35	12	18	18	25
Talladega gravelly silt loam, thick solum variant, 20 to 30 percent slopes	20	35	12	18	18	25
Talladega gravelly silt loam, thick solum variant, 20 to 45 percent slopes, moderately eroded						
Terrace escarpments						
Thurmont gravelly loam, 3 to 8 percent slopes, moderately eroded	35	65	18	28	30	45
Thurmont gravelly loam, 8 to 15 percent slopes, moderately eroded	30	55	15	25	25	40
Trego gravelly silt loam, 0 to 3 percent slopes	40	65	20	35	30	45
Trego gravelly silt loam, 3 to 15 percent slopes, moderately eroded	35	55	15	20	20	30
Tyler silt loam, 0 to 8 percent slopes	40	65				
Warners loam, 0 to 8 percent slopes	70	100				
Waynesboro gravelly loam, 0 to 3 percent slopes	45	75	25	35	35	50
Waynesboro gravelly loam, 0 to 8 percent slopes, moderately eroded	42	70	22	30	32	45
Waynesboro gravelly loam, 8 to 15 percent slopes, moderately eroded	40	65	20	28	30	40
Waynesboro gravelly loam, 3 to 15 percent slopes, severely eroded	30	50	15	22	20	30
Waynesboro gravelly loam, 15 to 25 percent slopes, moderately eroded	35	55	18	25	25	35
Waynesboro gravelly loam, 15 to 25 percent slopes, severely eroded						
Waynesboro gravelly loam, 25 to 45 percent slopes, moderately eroded						
Waynesboro gravelly sandy loam, 0 to 8 percent slopes	35	55	15	25	28	40
Waynesboro gravelly sandy loam, 3 to 15 percent slopes, moderately eroded	30	50	15	22	20	30
Waynesboro gravelly sandy loam, 8 to 15 percent slopes, severely eroded	20	35	8	15	15	20
Waynesboro gravelly sandy loam, 15 to 25 percent slopes, moderately eroded	25	45	10	20	18	25
Wehadkee silt loam	35	60				
Westmoreland channery silt loam, 3 to 10 percent slopes, moderately eroded	55	85	30	40	40	60
Westmoreland channery silt loam, 10 to 20 percent slopes, moderately eroded	45	75	22	30	30	45
Westmoreland channery silt loam, 3 to 20 percent slopes, severely eroded	35	55	18	25	25	38
Westmoreland channery silt loam, 20 to 30 percent slopes, moderately eroded	40	65	20	28	28	40
Westmoreland channery silt loam, 20 to 30 percent slopes, severely eroded						

[1] Yields for cherries are not given on an acre basis, but as pounds per tree.

levels of management on the soils suitable for crops or pasture—Continued

yields are not given, either the soil is not suitable for that crop or there is no information on which to base an estimate]

Oats		Alfalfa		Clover and mixed hay		Apples		Peaches		Prunes and plums		Cherries [1]		Pasture (cow-acre-days) [2]	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Lb.*	*Lb.*		
40	60	3.0	4.0	2.0	2.9									135	170
35	55	2.8	3.8	1.8	2.6	180	260	135	195	160	230	90	130	120	150
30	45	2.2	3.2	1.4	2.1	140	240	105	180	120	210	70	120	95	120
														70	100
25	40	1.8	2.6	1.2	1.8	110	190	80	145	95	165	55	95	70	100
														60	90
30	40	2.6	3.4	1.5	2.3	120	170	90	125	105	150	60	85	90	110
25	35	1.8	2.6	1.2	1.7	110	160	80	120	95	140	55	80	70	95
20	30	1.4	2.2	.9	1.3	90	130	65	95	80	115	45	65	55	85
20	30	1.4	2.2	.9	1.3	90	130	65	95	80	115	45	65	55	85
														35	55
40	60	3.0	4.0	2.0	2.9									135	170
35	55	2.8	3.8	1.8	2.6	180	260	135	195	160	230	90	130	120	150
30	45	2.2	3.2	1.4	2.1	140	240	105	180	120	210	70	120	95	120
40	60	3.6	4.6	2.2	3.0									135	170
35	50	3.2	4.0	1.9	2.7	180	260	135	195	160	230	90	130	125	160
30	45	3.0	4.0	1.8	2.4	140	240	105	180	120	210	70	120	115	145
25	32	2.6	3.6	1.6	2.2	110	190	80	145	95	165	55	95	75	100
														55	80
25	35	2.8	3.8	1.7	2.3	125	220	90	160	105	185	60	100	85	115
														70	100
40	60	3.6	4.6	2.2	3.0									135	170
35	50	3.2	4.0	1.9	2.7	180	260	135	195	160	230	90	130	125	160
30	45	3.0	4.0	1.8	2.4	140	240	105	180	120	210	70	120	115	145
														55	80
														75	110
														100	150
35	50	2.4	3.4	1.5	2.2									120	160
35	50	2.4	3.4	1.5	2.2									120	160
30	45	1.8	3.0	1.4	2.1									90	130
35	50	2.4	3.4	1.5	2.2									120	160
														95	135
				1.6	2.5									115	150
20	35	1.6	2.6	1.2	1.7	120	170	90	125	105	150	60	85	60	90
18	25	1.2	2.2	1.0	1.5	100	150	75	110	85	130	50	75	45	70
18	25	1.2	2.2	1.0	1.5	100	150	75	110	85	130	50	75	45	70
														35	60
														75	100
30	45	2.2	3.2	1.4	2.3	150	200	105	150	125	175	75	100	80	115
25	40	2.0	2.8	1.2	2.0	120	170	90	130	105	150	60	85	60	95
				1.5	2.5									85	120
				1.2	2.3									65	95
				1.2	2.2									70	100
				2.6	3.7									160	210
35	50	2.8	3.8	1.7	2.4	170	240	125	180	150	210	85	120	100	140
32	45	2.6	3.2	1.5	2.2	140	210	110	160	125	185	70	105	90	125
30	40	2.4	3.0	1.3	1.9	130	180	95	140	110	160	65	90	75	110
20	30	1.4	2.2	.9	1.3	90	130	65	100	75	115	45	65	55	80
25	35	2.0	2.6	1.1	1.7	120	170	90	125	105	145	60	85	60	90
														50	75
														55	80
28	40	2.2	3.2	1.3	2.0	130	180	95	140	110	160	65	90	70	100
20	30	1.8	2.6	1.1	1.6	90	130	65	100	80	115	45	65	50	75
15	20			.6	1.0	70	100	50	75	60	85	35	50	40	60
18	25	1.2	2.0	.7	1.2	80	120	60	90	70	105	40	60	45	65
				1.2	2.0									70	100
35	55	3.0	4.2	2.0	2.8	180	260	135	195	155	225	90	130	120	155
30	45	2.4	3.2	1.6	2.4	140	210	105	155	125	160	70	105	100	135
25	38	1.8	2.6	1.3	2.0	100	150	75	110	85	130	50	75	75	105
28	40	2.0	2.8	1.4	2.2	120	175	90	130	105	145	60	85	80	110
														50	80

[2] The number of days in a calendar year that 1 acre will support 1 cow, horse, or steer without injury to the pasture.

Use and Management of Soils

This section has four subsections. The first consists of an explanation of the capability classification of soils and of suggestions for the use and management of the soils of the county for agriculture; the second discusses the use of the soils for forest; the third is concerned with engineering properties of soils in relation to highway construction, irrigation, sewage disposal, and other engineering projects; and the fourth discusses the use of the soil survey in community and county planning.

Capability Groups of Soils

The capability classification is a grouping of soils that shows, in a general way, how suitable they are for most kinds of farming. It is a practical grouping based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels—the capability class, subclass, and unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes there can be up to four subclasses. The subclass is indicated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* means that water in or on the soil will interfere with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony, and *c*, used in only some parts of the country, indicates that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses *w*, *s*, and *c*, because the soils in it have little or no erosion hazard but have other limitations that limit their use largely to pasture, range, woodland, or wildlife.

Within the subclasses are the capability units, groups of soils enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping of soils for many statements about their management. Capability units are generally identified by numbers assigned locally, for example, IIe–1 or IIIe–4.

Soils are classified in capability classes, subclasses, and units in accordance with the degree and kind of their permanent limitations; but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soil; and without consideration of possible but unlikely major reclamation projects.

The eight classes in the capability system, and the subclasses and units in this county, are given in the list that follows. The numbers of the units in the list are not consecutive because they are a part of a statewide system of capability grouping, not all units of which are represented in Washington County.

Class I. Soils that have few limitations that restrict their use.
- Capability unit I–1. Deep, well-drained, nearly level soils developed from or influenced by limestone.
- Capability unit I–4. Deep, well-drained, nearly level soils not significantly influenced by limestone.
- Capability unit I–6. Deep, well-drained soils on flood plains and low terraces.

Class II. Soils that have some limitations that reduce the choice of plants or that require moderate conservation practices.

Subclass IIe. Nearly level to gently sloping soils, subject to erosion if tilled.
- Capability unit IIe–1. Deep, well-drained, nearly level to gently sloping soils with a friable surface layer; developed from or influenced by limestone and moderately limited by the hazard of erosion.
- Capability unit IIe–4. Deep, well-drained, nearly level to gently sloping soils; not appreciably influenced by limestone but moderately limited by the hazard of erosion.
- Capability unit IIe–10. Nearly level to sloping, well-drained soils that are somewhat shallow to moderately deep to acid rock.
- Capability unit IIe–11. Nearly level to sloping, somewhat excessively drained soils that are shallow to materials somewhat influenced by lime.
- Capability unit IIe–13. Gently sloping, moderately eroded soils that have a tight subsoil that restricts drainage.
- Capability unit IIe–19. Deep, well-drained, nearly level to gently sloping, heavy-textured or fine-textured soils developed from limestone, and which are moderately limited by the hazard of erosion.
- Capability unit IIe–26. Deep, well-drained, nearly level to gently sloping, friable soils developed from cherty limestone, and which are moderately limited by the hazard of erosion.

Subclass IIw. Moderately wet soils.
- Capability unit IIw–1. Nearly level to gently sloping soils that have impeded drainage and that are not influenced by lime.
- Capability unit IIw–7. Nearly level to sloping, moderately well drained soils of flood plains and upland depressions, not subject to frequent damaging floods.

Subclass IIs. Nearly level to sloping soils, moderately limited by physical characteristics.
- Capability unit IIs–1. Deep, well-drained, nearly level, heavy-textured or fine-textured soils that have developed from limestone; moder-

ately limited by difficulty of cultivation and management.

Capability unit IIs–2. Nearly level to sloping, sandy and gravelly soils; moderately limited by low moisture capacity.

Capability unit IIs–7. Nearly level to sloping, well-drained soils that are rather shallow to acid rock; moderately limited by low moisture capacity.

Class III. Soils that have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Subclass IIIe. Sloping soils that have high risk of erosion if tilled.

Capability unit IIIe–1. Deep, well-drained, sloping to somewhat rolling soils with a friable surface layer; developed from or influenced by limestone, and moderately eroded.

Capability unit IIIe–4. Deep, well-drained, sloping to somewhat rolling soils, not appreciably influenced by limestone, and moderately eroded.

Capability unit IIIe–5. Deep, well-drained, gently to strongly sloping, sandy and gravelly soils that are moderately eroded.

Capability unit IIIe–6. Well-drained soils on bottom land that have short, irregular, and, in some places, rather steep slopes; subject to serious erosion.

Capability unit IIIe–10. Sloping to strongly sloping, well-drained soils that are somewhat shallow to acid rock, and are moderately eroded.

Capability unit IIIe–13. Sloping to strongly sloping, moderately eroded soils that have a tight subsoil that restricts drainage.

Capability unit IIIe–26. Deep, well-drained, sloping to strongly sloping, moderately eroded soils that have developed from cherty limestone.

Capability unit IIIe–30. Moderately deep and deep, well-drained, sloping and moderately eroded, or gently sloping and severely eroded, fine-textured soils that have developed from limestone.

Capability unit IIIe–31. Sloping to strongly sloping, somewhat excessively drained, moderately eroded soils that are shallow to materials somewhat influenced by lime.

Capability unit IIIe–32. Sloping to strongly sloping, well-drained, moderately eroded soils that are rather shallow to acid rock.

Capability unit IIIe–44. Deep, well-drained, gently sloping and sloping, severely eroded soils not influenced by limestone.

Subclass IIIw. Wet soils that require artificial drainage if tilled.

Capability unit IIIw–1. Poorly drained soils of flood plains, not influenced by lime.

Capability unit IIIw–2. Poorly drained and very poorly drained soils of flood plains, strongly influenced by lime.

Subclass IIIs. Soils that are severely limited by their physical characteristics.

Capability unit IIIs–2. Gently sloping and sloping, excessively drained, moderately eroded, very shallow soils.

Class IV. Soils that have very severe limitations that restrict the choice of plants, or that require very careful management, or both.

Subclass IVe. Soils that are very severely limited by risk of erosion if tilled.

Capability unit IVe–1. Moderately deep and deep, rolling to hilly, well-drained soils; moderately to severely eroded and developed from or influenced by limestone.

Capability unit IVe–3. Deep, rolling to hilly, well-drained soils, mostly moderately eroded and not appreciably influenced by limestone.

Capability unit IVe–5. Deep, well-drained, sloping to rolling, gravelly and sandy soils that are moderately and severely eroded.

Capability unit IVe–9. Strongly sloping to hilly, moderately eroded soils that have a tight subsoil that restricts drainage.

Capability unit IVe–10. Strongly sloping to hilly, well-drained soils that are somewhat shallow to acid rock; moderately to severely eroded.

Capability unit IVe–26. Deep, well-drained, rolling to hilly soils developed from cherty limestone; moderately to severely eroded.

Capability unit IVe–31. Rolling to hilly, somewhat excessively drained soils that are shallow to materials somewhat influenced by lime; moderately to severely eroded.

Capability unit IVe–32. Rolling to hilly soils that are shallow to acid rock; moderately and severely eroded.

Class V. Soils that have little or no erosion hazard but have other limitations that are impractical to remove and that limit their use largely to pasture, woodland, or wildlife food and cover. Only subclass Vs is in this county, but the soils subject to frequent floods, if mapped separately, would be in this class, subclass Vw.

Subclass Vs. Soils that are limited in use to grazing or woodland because of excessive stoniness or rockiness.

Capability unit Vs–1. Nearly level, well-drained, very rocky soils; rockiness consists of limestone outcrops.

Capability unit Vs–2. Nearly level or very gently sloping, stony and very stony soils that are mostly well drained and not affected by limestone.

Class VI. Soils that have severe limitations that make them generally unsuitable for cultivation and limit their use largely to pasture, woodland, or wildlife food and cover.

Subclass VIe. Soils that are moderately limited for pasture or trees by risk of erosion if cover is not maintained.

Capability unit VIe–1. Rolling and severely eroded or steep and moderately eroded, well-drained soils that have developed from limestone.

Capability unit VIe–2. Rolling and severely eroded or steep and moderately eroded, well-

599553—62——5

drained, fairly deep soils that have not been appreciably affected by limestone.

Capability unit VIe–3. Sloping and severely eroded to moderately steep, practically uneroded, shallow and very shallow soils.

Subclass VIw. Soils severely limited by poor drainage or by very frequent damaging overflow, or both.

Capability unit VIw–1. Poorly drained soils subject to very frequent overflows.

Subclass VIs. Soils severely limited by stones and outcrops of rock.

Capability unit VIs–1. Sloping to steep, well-drained, very rocky soils that are moderately eroded; rockiness consists of limestone outcrops.

Capability unit VIs–2. Gently sloping to moderately steep, well-drained, very stony soils that are not affected by limestone.

Class VII. Soils that have very severe limitations that make them unsuitable for cultivation and that restrict their use largely to pasture, woodland, or wildlife shelter.

Subclass VIIe. Soils restricted in use to woodland and grazing because of extreme hazard of erosion.

Capability unit VIIe–1. Very steep or very severely eroded soils, or both, which have developed from limestone.

Capability unit VIIe–2. Very steep or very severely eroded soils, or both, which are not influenced by limestone.

Capability unit VIIe–3. Very steep or very severely eroded, shallow soils, or both.

Subclass VIIs. Soils restricted in use to woodland and grazing by extreme rockiness or stoniness.

Capability unit VIIs–1. Severely eroded or very steep, very rocky and extremely rocky soils; rockiness consists of limestone outcrops.

Capability unit VIIs–2. Shallow or steep, very stony soils that are not influenced by limestone.

Class VIII. Soils and land types not suitable for agriculture and restricted in use to recreation and wildlife.

Subclass VIIIs. Land restricted to nonagricultural uses because of adverse physical characteristics.

Capability unit VIIIs–1. Extremely rough, stony, and steep land, and large expanses of barren rock.

Management by Capability Units

On the following pages each capability unit is described briefly, the soils in each unit are listed, and some suggestions for the use and management of those soils are given.

CAPABILITY UNIT I–1

This unit consists of deep, well-drained soils that have been developed in material that weathered from limestone or was otherwise strongly influenced by lime. The soils occupy nearly level areas in valleys and on old stream terraces. None of these soils has been significantly affected by erosion. All of them have a rather friable surface layer, and they are easily worked and managed. The soils of this unit are—

Duffield silt loam, 0 to 3 percent slopes.
Etowah gravelly loam, 0 to 3 percent slopes.
Etowah silt loam, 0 to 3 percent slopes.
Frankstown and Duffield channery silt loams, 0 to 3 percent slopes.
Hagerstown silt loam, 0 to 3 percent slopes.
Hagerstown silty clay loam, 0 to 3 percent slopes.

These soils occur throughout the great limestone valley section of the eastern part of the county. Their total area is about 5,300 acres, or 1.8 percent of the county.

All of the soils of this capability unit are fertile and productive. They have the highest natural fertility of any group of soils in the county. They are easily worked, with little danger of deterioration by erosion or loss of productiveness. These soils are well suited to all crops common to the county, with the possible exception of orchard crops because of poor air drainage in many locations. They are excellent for pasture. They are deep and well drained and have a thick, friable surface layer of medium to moderately fine texture. The Frankstown soils contain some chert, shale, or in some places limestone fragments, but this in no way interferes with cultivation or lessens their productiveness.

Practically all soils of this capability unit have been cleared and are in use for crops or pasture (except for some urban areas). Agriculture in Washington County is essentially dairy and livestock farming. These enterprises are especially concentrated and important on the soils in this capability unit. Some of these soils are used for corn year after year, almost continuously, but a 3-year rotation is more common. Corn or some other row crop is generally followed by wheat or barley, or sometimes by oats, and these, in turn, are followed by clover or mixed hay, or sometimes by alfalfa. Some fields are kept in alfalfa for 3 to 5 years, then put into corn for a year or more, and then are reseeded to alfalfa. There are some excellent pastures on these soils.

Although some of these soils are being used to their best advantage in agriculture, urban and suburban expansion are using up some of the best agricultural land in the county. On the areas that are still used for agriculture, there are some measures that would increase productiveness. Soil testing should be more universally done, in order that fertilizers and lime can be used to their greatest effectiveness. When corn is grown almost continuously, a winter cover crop should be grown between corn crops. None of these soils has a slope of more than 3 percent, but the long slopes should be farmed in strips at right angles to the direction of the grade, to help prevent possible losses by erosion.

These are the best soils of the county. They should be more intensively farmed and even better managed. They contribute much to the economy of the county, but could contribute even more.

CAPABILITY UNIT I–4

This unit consists of deep, well-drained, nearly level soils. The soils occupy small areas on flat ridgetops in the uplands and in some valleys, and they are also on some old terraces. They have not been significantly influenced by limestone, except for some areas of the Murrill soils.

None of the soils in this unit has been significantly affected by erosion. The soils in this unit are—

Fauquier channery loam, 0 to 5 percent slopes.
Fauquier silt loam, 0 to 3 percent slopes.
Highfield gravelly loam, 0 to 5 percent slopes.
Holston gravelly loam, 0 to 3 percent slopes.
Holston silt loam, 0 to 3 percent slopes.
Laidig gravelly loam, 0 to 3 percent slopes.
Murrill gravelly loam, 0 to 3 percent slopes.
Murrill silt loam, 0 to 3 percent slopes.
Myersville channery loam, 0 to 3 percent slopes.
Myersville silt loam, 0 to 3 percent slopes.
Waynesboro gravelly loam, 0 to 3 percent slopes.

These soils occur in many parts of the county. Although none of them is strictly within the great limestone valley, some of them are on foot slopes and other areas adjacent to the valley. The total area of the soils is about 3,300 acres, or 1.1 percent of the county.

These soils are deep and not eroded; they have a moderate to high moisture-supplying capacity. The soils have little limitation for use for any purpose. They differ from the soils of capability unit I–1 in that they are commonly more acid, are much more gravelly or channery, and as a rule are somewhat less productive. Although a number of different soils make up this capability unit, the individual areas of most of them are rather small. They occupy the most nearly level spots in much larger areas where most of the soils are sloping to hilly.

None of these soils has been significantly affected by erosion. Because they are acid, the soils need lime, and they also need a good fertility program. They are, on the average, only fairly well supplied with plant nutrients.

The soils of capability unit I–4 are used for all of the common crops of the county and for good quality pasture. Some of them, particularly those of the Laidig and Murrill series, have sufficiently good air drainage for good orchards, but this is not true of all the areas. Most of these soils have been cleared and put to use, but some small areas are still in forest. Yields are commonly less than on soils of capability unit I–1, yet some of the finest farms in the county are located where these soils are being well managed.

Because they generally occur in small spots, management is commonly the same as for surrounding or adjacent soils that make up a greater part of many fields. The surrounding soils may belong to almost any capability unit, but most commonly are in capability unit IIe–4 or IIIe–4. The soils of capability unit I–4 require somewhat more careful management than soils of capability unit I–1, because they are somewhat less fertile. Either 3-year or 4-year rotations are ideal for them, but rotations can well be extended to 5 or more years if such a crop as alfalfa occupies the land for 3 or more years.

Under average present management, yields on soils of capability unit I–4 are fairly high, but could be improved considerably by more careful management and treatment. Good average yields of corn, for instance, are probably between 50 and 70 bushels per acre, but these yields could be increased by 20 to 30 bushels. It is not at all unusual to have yields of 90 to 100 bushels or more on the best managed fields, and, if improved management were more widely practiced, the average yields of corn could approach such figures.

CAPABILITY UNIT I–6

This unit consists of nearly level, well-drained, friable soils on flood plains and on low stream terraces. These soils may be flooded, but normally flooding is very infrequent. The soils of this unit are—

Ashton fine sandy loam, 0 to 5 percent slopes.
Congaree silt loam and gravelly loam.
Huntington fine sandy loam.
Huntington gravelly loam.
Huntington silt loam.
Huntington silt loam, local alluvium.
Pope fine sandy loam.
Pope gravelly loam.
Pope silt loam.

These soils are located along streams and rivers in all parts of the county. The largest areas are within flood plains in the great limestone valley, or in upland depressions where similar materials have accumulated. Small, very narrow strips that lie along some of the smaller streams and drainageways are generally used and managed like the adjacent soils. The total area of this unit is about 11,500 acres, or 3.9 percent of the county.

These soils are well suited to most of the common crops and to pasture. The Pope and Congaree soils are fairly fertile, and crops on them respond well to management; the Huntington and Ashton soils are even more fertile and productive. Although orchards are not generally planted on soils of the flood plains, there are some orchards on these soils in the county. Some crops can be grown on these soils without fertilizer or lime, but the practice is not recommended. The moisture supply is nearly always adequate for crops, since these deep soils are readily penetrated by roots.

A few areas of these soils may be subject to floods that damage crops. The use of these areas should be adjusted to the flood hazard; for example, areas that are very frequently flooded should be kept in permanent sod or trees.

Corn and hay are the principal crops. Corn may be grown continuously year after year, preferably with a cover crop between corn seasons. Mixed hay is a common crop and may be grazed part of the time. Small grains as a rule are not grown, because there is some danger of flooding and lodging.

The average productivity of these soils, particularly of the Ashton and the Huntington soils, is high. Of special importance is the fact that well-managed pastures on these soils have perhaps the greatest carrying capacities of any pastures in the county. Fertilizer and lime should be used on these soils as indicated by soil tests, and they will generally be applied to corn, whether it is grown in rotation or as a continuous crop. Animal manure is especially valuable for corn.

Weeds are a common pest in pastures unless they are controlled. They can be controlled with chemical weed killers, or by proper fertilization, carefully regulated grazing, and mowing at proper intervals. Perhaps the most valuable single tool in pasture management on any soil is the mowing machine, and the machine is easily used on these soils.

CAPABILITY UNIT IIe–1

This unit consists of deep, well-drained, nearly level to gently sloping soils that have a friable surface layer.

These soils have been developed in or strongly influenced by material that weathered from limestone, and they are moderately limited by the hazard of erosion. The soils of this unit are—

Duffield silt loam, 3 to 8 percent slopes, moderately eroded.
Dunmore cherty silt loam, 3 to 8 percent slopes, moderately eroded.
Etowah gravelly loam, 3 to 8 percent slopes, moderately eroded.
Etowah silt loam, 3 to 8 percent slopes, moderately eroded.
Frankstown and Duffield channery silt loams, 3 to 8 percent slopes, moderately eroded.
Hagerstown silt loam, 0 to 8 percent slopes, moderately eroded.
Hagerstown silty clay loam, 0 to 8 percent slopes, moderately eroded.
Westmoreland channery silt loam, 3 to 10 percent slopes, moderately eroded.

These soils are extensive in the limestone valley, and they occur in scattered areas in the western part of the county. They occupy about 48,500 acres, which is 16.4 percent of the county.

Besides being deep, well drained, and fertile, the soils of this capability unit are fairly easily worked and managed and are highly productive. Although erosion is a problem, it is not a serious one under good management. The soils can be fairly easily conserved. Since there has been some erosion, these soils are slightly less productive, on the average, than those of capability unit I–1. The soils of unit IIe–1 need careful attention, and most of them have been getting it ever since the area was first settled.

These soils are used the same way as the soils of capability unit I–1; that is, for corn, small grains, hay crops, and pasture, in support of the dominant livestock economy where they occur. In addition, some areas, particularly of Dunmore and Westmoreland soils, are used for orchards. In general farming, 3-year and 4-year rotations are commonly used. The chief single crops are corn and hay, generally grown in a rotation of 1 year of corn followed by 2 or more years of mixed hay or of alfalfa. These soils are particularly well suited to legumes, such as alfalfa and clover, which in turn contribute much to the fertility and productivity of the soils. Yields of all crops are high under average prevailing management.

The special management needed on these soils consists chiefly of the maintenance of fertility and the prevention of erosion. The soils should be tested and given lime and fertilizer according to the needs indicated. Full use should be made of all manure and crop residue. Erosion is not serious. It never will be a very great hazard if proper contour tillage and stripcropping, with supporting practices, are used. In some places runoff water should be diverted into natural drainageways, and the drainageways should be kept carefully sodded. Outlets of such diversions must be well prepared and carefully maintained or the concentrated water is likely to cause gullies.

These soils are the most important in the county because of their extent and their high productivity. If they are properly conserved and carefully managed, production can become even higher and there will never be more than a slight danger of damaging soil losses. The soils are probably more productive now than they were a hundred years ago.

CAPABILITY UNIT IIe–4

This unit consists of deep, well-drained, nearly level to gently sloping soils that were developed in nonlimy materials and are not appreciably influenced by limestone. The soils are similar to those of capability unit I–4, but they are more limited by the hazard of erosion. In this unit are—

Braddock and Thurmont gravelly loams, 3 to 8 percent slopes, moderately eroded.
Edgemont and Laidig channery loams, 0 to 12 percent slopes.
Fauquier channery loam, 5 to 10 percent slopes, moderately eroded.
Fauquier silt loam, 3 to 10 percent slopes, moderately eroded.
Highfield gravelly loam, 5 to 10 percent slopes, moderately eroded.
Holston gravelly loam, 0 to 8 percent slopes, moderately eroded.
Holston silt loam, 3 to 8 percent slopes, moderately eroded.
Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded.
Murrill gravelly loam, 0 to 8 percent slopes, moderately eroded.
Murrill silt loam, 0 to 8 percent slopes, moderately eroded.
Myersville channery loam, 3 to 10 percent slopes, moderately eroded.
Myersville silt loam, 3 to 10 percent slopes, moderately eroded.
Thurmont gravelly loam, 3 to 8 percent slopes, moderately eroded.
Waynesboro gravelly loam, 0 to 8 percent slopes, moderately eroded.

These soils are located throughout the county except in the limestone valley. The total area is about 22,200 acres, or 7.5 percent of the county. The soils are much like those of capability unit IIe–1, except that they have not been appreciably influenced by limestone in their development.

All of these soils are acid unless they have been limed, although in some places lime is present in the deep, underlying strata. They are all at least moderately fertile, and the best of these soils, particularly those of the Fauquier, Highfield, Murrill, and Myersville series, are highly productive. Perhaps the soils of the lowest natural productivity are those of the Laidig series. All the soils are medium textured, and many of them have considerable amounts of gravel or schist fragments in the surface layer and throughout the profile. The surface layer is friable and easily worked when moist.

Some of the soils of this capability unit have slopes up to 10 or 12 percent, and, on some of the sloping soils, there has been a moderate amount of erosion. Nowhere is erosion very serious, but everywhere it is more of a hazard than it is on the soils of capability unit I–4.

These soils are widely used for livestock and general farming. Many of the better orchards are concentrated on them, particularly in the areas near Smithsburg, Boonsboro, and Clear Spring. This is not only because the soils are well drained, permeable, and fertile, but also because they are in positions that have the good air drainage so essential for practical orcharding. Apples, peaches, prunes, and plums are extensively grown.

Cropping systems are essentially the same as for the soils in capability unit I–4. The 3-year rotation is the most commonly followed, but rotations may extend as long as 5 or 6 years if alfalfa is grown for 3 years or more. A large proportion of the soils is in pasture, probably more than in any other capability unit. The pastures generally have been well managed, and their carrying capacity is high. Grass-clover mixtures are most commonly used for grazing. Much hay is produced, consisting of alfalfa,

clovers, or mixtures of these. Most of these soils have been fairly well managed, and many of the farmers are cooperators with the soil conservation district.

The chief requirements for soil management are to maintain fertility and prevent erosion. These soils need more fertilizer, manure, and lime than do the soils of the limestone valley. If such amendments are used according to the needs indicated by soil tests, fertility and productivity can be maintained.

On long slopes that have gradients of 10 to 12 percent, contour tillage, stripcropping, and very careful water disposal are needed to prevent loss of soil. These measures, plus the maintenance of a vegetative cover most of the time will prevent soil losses, or at least limit them to allowable amounts.

Management of these soils generally has been good, but it can be improved on many farms. Observations show that the average productivity of these soils can be increased by perhaps 30 to 40 percent through the use of methods that are already known. A few of the better farms are producing at least that much more than average farms on the same soils. With improved management, these soils can continue to produce high yields for the indefinite future with little, if any, deterioration.

CAPABILITY UNIT IIe–10

In this unit are nearly level to sloping, well-drained soils that are somewhat shallow to moderately deep over shale or schist. Some areas have lost part of the original surface layer through erosion, and danger of erosion is a limiting hazard on all areas. The soils of this unit are—

Calvin channery loam, 3 to 10 percent slopes, moderately eroded.
Calvin channery fine sandy loam, 3 to 10 percent slopes, moderately eroded.
Chandler silt loam and channery silt loam, 0 to 10 percent slopes.
Chandler silt loam and channery silt loam, 3 to 10 percent slopes, moderately eroded.

These soils are in various parts of the county, except in the limestone valley. They occupy about 1,600 acres, or one-half of 1 percent of the county.

Because these soils are somewhat shallow to moderately deep and are well drained, they become somewhat droughty during long, dry periods. All of these soils are strongly acid and rather low in fertility, so they are less productive, on the average, than most of the other soils of capability class II. General farming is the chief agricultural pattern, with some emphasis on orchards. The Calvin soils are in the western part of the county, and the Chandler soils, mostly near the Potomac River north and west of Harpers Ferry.

In general farming the 3-year rotation of corn, a small grain, and hay is most commonly used. However from a standpoint of maximum soil protection and greatest production over long periods, the rotation could be increased to 4 or 5 years. Hay crops or pasture should be used to extend the rotations. On these rather shallow, acid soils, alfalfa does not last so well as on most deeper soils, and it is seldom kept in fields for more than 2 years or possibly 3 years.

All of the soils of capability unit IIe–10 require measures to maintain fertility, and they should have all the moisture-conserving practices that can be applied. Considerable amounts of fertilizer will be required, and a great deal of lime. Amounts to be used should be decided only after the soils have been tested for content of the various plant nutrients and the requirement for lime has been determined. All available animal manure and plant residue should be returned to the soil. Leguminous crops and cover crops should be grown wherever possible. Contour tillage and contour stripcropping will be especially valuable in conserving moisture and in checking erosion. Wherever water concentrates, as in waterways and outlets, it should be dispersed on a sodded area. This will slow down the flow of water and allow more to penetrate into the soil, and the sod will catch much of the soil material carried in the water.

CAPABILITY UNIT IIe–11

This unit consists of nearly level to sloping, somewhat excessively drained soils that are moderately deep over shale material that contains some lime. These soils are limited by shallowness and by the moderate hazard of erosion. They are—

Litz channery loam, 3 to 10 percent slopes, moderately eroded.
Litz-Teas channery silt loams, 0 to 8 percent slopes.

The soils of this unit are a little more fertile than the soils of capability units IIe–10 and IIIs–2, because of the influence of lime. They are in scattered areas in the western part of the county, and also on some narrow ridgetops within the limestone valley. Their total area is about 1,500 acres, or one-half of 1 percent of the county.

Some of the Litz channery loam is still in forest, but practically all of the acreage of Litz-Teas channery silt loams in this capability unit are in more intensive use. Even though these soils are moderately deep and tend to be droughty at times, they are rather extensively used for orchards. Orchards on them are somewhat more productive than those on the other somewhat shallow soils of the same areas, notably those of capability units IIe–10 and IIIs–2.

Although erosion has not been very active on the soils of capability unit IIe–11, the hazard of erosion is present. For control of erosion and management of the soil, the same practices are needed that have been indicated for capability unit IIe–10. With these practices, the soils of capability unit IIe–11 should be productive in spite of their shallowness and tendency to be droughty.

CAPABILITY UNIT IIe–13

This unit consists of gently sloping, moderately eroded soils that have a tight subsoil that restricts drainage. These soils are only moderately well drained, even though they have good surface drainage. The soils of this unit are—

Buchanan gravelly loam, 3 to 8 percent slopes, moderately eroded.
Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded.
Leadvale gravelly silt loam, 3 to 8 percent slopes, moderately eroded.
Monongahela gravelly loam, 3 to 8 percent slopes, moderately eroded.
Monongahela silt loam, 3 to 8 percent slopes, moderately eroded.

These soils are in various parts of the county, outside the limestone valley. The areas, as a rule, are small. Their

total area is about 2,600 acres, or about eight-tenths of 1 percent of the county.

These soils are used for general crops, but many of them are still in forest. Although surface drainage is good, much water is retained in the soil in wet seasons because internal drainage is slow. This causes heaving, particularly in spring; perennial crops, such as alfalfa, are damaged, and the stands do not last long. Because of wetness in spring, corn is generally planted later on these soils than on well-drained soils.

The slow internal drainage promotes runoff, so the hazard of erosion is greater than is normal on moderate slopes. Runoff should be diverted above areas of these soils wherever possible. Strips should not be exactly on the contour, but graded to promote drainage. All outlets of waterways and diversion terraces must be sodded or otherwise carefully protected to prevent the formation of rills and gullies.

In general farming a 3-year rotation of row crops, grain, and hay is satisfactory. The soils are very good for pasture, and tall grasses and wet-tolerant clovers grow well. Grazing should be limited during wet periods to prevent puddling and compacting of the surface layer.

These soils are subject to erosion and also to the hazards of restricted internal drainage. To manage them successfully, it is necessary to provide cover and control runoff, provide surface drainage, choose water-tolerant crops, and avoid cultivating or trampling when the soil is wet.

CAPABILITY UNIT IIe–19

This unit consist of deep, well-drained, nearly level or gently sloping, fine-textured soils that are underlain by limestone and are moderately limited by the hazard of erosion. The soils of this unit have a finer textured surface layer than those of capability unit IIe–1, and they are more difficult to cultivate and to manage. The soils of this unit are—

Benevola clay loam, 3 to 8 percent slopes, moderately eroded.
Hagerstown clay loam, 0 to 8 percent slopes, moderately eroded.

These soils are in various parts of the limestone valley. They amount to about 1,200 acres, or four-tenths of 1 percent of the county.

These soils contain lime and are above average in fertility. They are also heavy and tend to warm up late in spring. The soils are gently sloping but wash easily because water does not readily penetrate the fine-textured surface layer. Plowing and cultivating are difficult and almost impossible when the soil is too wet or too dry. The soils are sticky and plastic; they puddle and form clods easily if worked a little too wet, and generally are very hard when they are too dry. Maintaining good soil structure by turning under cover crops and crop residues and by using large amounts of animal manure may be one key to success in managing these soils.

When properly managed, these are excellent agricultural soils and are suitable for practically all crops. Erosion control is highly important. Farming should be done in well-graded strips, with diversions and waterways to control and dispose of water with great care.

CAPABILITY UNIT IIe–26

This unit consists of deep, well-drained, nearly level to gently sloping, friable soils that are underlain by cherty limestone and are moderately limited by the hazard of erosion. The surface of the soil is generally covered with small chert fragments that help to protect it from erosion. The soils of this unit are—

Elliber cherty loam, 5 to 12 percent slopes, moderately eroded.
Frederick cherty silt loam, 0 to 8 percent slopes, moderately eroded.

These are excellent orchard soils where air drainage is satisfactory. They occur, generally on ridgetops, in the western part of the county. The total area is about 1,200 acres, or four-tenths of 1 percent of the county.

For general farming, a 4-year rotation with legume hay for 2 years is well suited to these soils. Although erosion is the most important management problem, the soils are not so readily eroded as many other soils that have the same degree of slope. The soils are somewhat open and porous, and the numerous chert fragments tend to protect the surface from rain splash and from washing.

In Washington County these soils are used intensively for orchards. They hold moisture well, and nearly all the areas have good air drainage. Most orchards are kept covered with a sod of grasses and clovers, which make excellent green manure when turned under once a year. The orchards should be planted and cultivated on the contour. The combination of contour cultivation and sod cover will check runoff and encourage water to enter the soil, thus reducing erosion damage while building up the moisture supply for the orchard trees.

CAPABILITY UNIT IIw–1

This unit consists of nearly level or very gently sloping soils that have somewhat impeded drainage. The soils are on uplands and terraces and have not been influenced by lime. The soils of this unit are—

Buchanan gravelly loam, 0 to 3 percent slopes.
Leadvale gravelly silt loam, 0 to 3 percent slopes.
Monongahela silt loam, 0 to 3 percent slopes.
Trego gravelly silt loam, 0 to 3 percent slopes.

Small tracts of these soils are scattered throughout most of the county outside of the limestone valley. There are only about 660 acres, or two-tenths of 1 percent of the county.

The soils of this capability unit are like those of capability units IIe–13 and IIIe–13, except that they are nearly level. Although they are considered to be moderately well drained, they are so nearly level that they remain wet for rather long periods and are slow to dry out and warm up in spring. The wetness resulting from impeded drainage in this climate is more of a problem than is the control of erosion.

The use of these soils is limited by their impeded drainage and also by their rather low fertility. The soils are used mostly for corn, hay crops, and pasture. Alfalfa is not well suited unless good drainage can be established, because the soil tends to heave in cold weather. The most common cropping systems are either continuous corn or corn followed by hay for 1 year or more.

The present uses of these soils are probably the most suitable. Hay crops should include tall grasses and clovers that tolerate wetness. The same plants are also suitable for pasture. Fertility must be maintained and lime applied for maximum productivity.

Runoff water from higher areas should be diverted around these soils and away from them. Diversion terraces will accomplish part of the drainage that is needed, and the wettest spots should have excess water removed by open V-type ditches or, in some places, by tile drains. When the soils are wet they cannot be cultivated and should not be grazed. Good grazing cannot be maintained if animals are allowed to trample the soils to puddle and compact them. Excluding animals when the soils are wet allows rest periods for the pastures and helps considerably in maintaining good grazing at other times.

Weeds and some sedges are common invaders of pastures on these soils. They should be kept under control by mowing at proper times.

CAPABILITY UNIT IIw-7

In this unit are nearly level to sloping, somewhat poorly drained to moderately well drained soils of flood plains and some upland depressions. The soils of this unit are—

Chewacla gravelly sandy loam.
Chewacla silt loam.
Largent silt loam.
Lindside silt loam.
Lindside silt loam, local alluvium.
Philo gravelly sandy loam.
Philo silt loam.
Warners loam, 0 to 8 percent slopes.

These soils are present in all parts of the county. They occupy about 6,800 acres, or 2.3 percent of the county.

These soils are grouped in this capability unit because they have some hazard of flooding, or because they have some impeded drainage and some water-control problems, even if they are seldom or never flooded.

The soils are somewhat more productive and can be managed more easily than most poorly drained soils, but they are less productive and less easy to manage than the well-drained soils of the flood plains.

The greater part of the acreage of these soils has been cleared, but many small areas are still in forest. These soils are suitable for crops after the drainage is improved. Some corn is grown, but it generally has to be planted late because the soil is too wet at normal planting time. Considerable hay is grown, but the most extensive use is for pasture.

Although management is much the same on all these soils, there may be considerable differences among the soils in response to management as measured by production. The soils of the Lindside and Warners series are, on the average, more productive than the soils of the Chewacla, Largent, and Philo series. The Warners loam, which is dark colored because of organic matter and contains free lime, is probably the most productive of all these soils under intensive management.

Internal drainage can be improved by use of open ditches or tile lines at the proper intervals and depth, by bedding, and by diversion of runoff.

CAPABILITY UNIT IIs-1

This unit consists of nearly level, deep, well-drained, fine-textured soils that are underlain by limestone. The soils have little or no erosion hazard, but the fine texture of the surface layer makes them difficult to manage and cultivate. The soils of this unit are—

Benevola clay loam, 0 to 3 percent slopes.
Hagerstown clay loam, 0 to 3 percent slopes.

Small areas of these soils are in the limestone valley. They amount to only about 300 acres, or one-tenth of 1 percent of the county.

These soils are much like those of capability unit IIe-19, except that they are practically level and show little or no effect of erosion. Partly because they are so nearly level, these soils remain wet later in spring than most well-drained soils. The fine texture and sticky consistence also tend to reduce percolation and keep them wet until the water dries out. Erosion is not a hazard of any importance.

Because the soils are fine textured and sticky, they can be plowed and cultivated only within a very narrow range of moisture content. When too dry, they are hard, and, when too wet, they puddle and clod very easily. The structure and consistence can be improved somewhat by keeping the soils in sod crops much of the time, by growing few crops that need clean cultivation, and by turning under large amounts of organic matter from cover crops, crop residue, and animal manure.

CAPABILITY UNIT IIs-2

In this unit are nearly level to sloping, sandy and gravelly soils of the terraces and valley slopes that have some hazard of erosion when they are cultivated. The most important characteristic of the soils for management, however, is that they are more or less open and porous and do not hold moisture well. The soils of this unit are—

Holston gravelly sandy loam, 3 to 8 percent slopes.
Murrill gravelly sandy loam, 0 to 8 percent slopes.
Pope gravelly sandy loam.
Waynesboro gravelly sandy loam, 0 to 8 percent slopes.

These soils occur in small, scattered areas. There are only 1,050 acres, a little less than four-tenths of 1 percent of the county.

These soils are sandy and gravelly enough so that crops on them are limited by the supply of moisture during drought. There is no drainage problem. The sandy Pope soil is slightly droughty and is further limited by a slight risk of flooding.

The soils of this capability unit are suitable for all the common crops, but, because they are rather low in natural fertility and in moisture capacity, special fertilizing and moisture-conserving practices are needed. Little alfalfa is grown, probably because of the risk of drought.

Heavy applications of fertilizer are needed for most crops. The soils are acid and need lime, but, because they are sandy, there is some danger of overliming. Liming should, therefore, be done only after a soil test. On these and other sandy soils, ground limestone is likely to be as good as or even better than burned or hydrated lime, and, if it is applied, there is little danger of overliming.

If the surface is kept covered by vegetation most of the time, there is little danger of erosion. Crops on these soils generally respond to irrigation; some orchards are being irrigated. Sprinkler irrigation is the only suitable type.

CAPABILITY UNIT IIs–7

This unit consists of nearly level to sloping, well-drained soils that are moderately deep over shale. Although there is some hazard of erosion, the most significant management problem is the maintenance of moisture and fertility because the soils are thin and somewhat droughty. The soils of this unit are—

Berks channery loam, ridges, 0 to 10 percent slopes, moderately eroded.
Berks silt loam, ridges, 0 to 10 percent slopes, moderately eroded.
Calvin-Berks channery loam, 0 to 10 percent slopes, moderately eroded.

These soils occur in the western part of the county and in areas more or less bordering Conocheague Creek. There are about 6,600 acres, which is 2.2 percent of the county.

These soils are limited by droughtiness and fertility problems because they are shallow over bedrock. There is not enough space in the soil above the bedrock to store large amounts of either available moisture or plant nutrients. There is also some risk of erosion.

Fertilizer is needed for the full production of crops. The soils will retain nutrients and moisture in larger amounts if organic matter is added to the plow layer. This can be green-manure crops (particularly legumes), crop residue, such as stubble and cornstalks, and animal manure. Irrigation is desirable for some crops if water is available and if irrigation is economically feasible.

These soils are used for general farming and are particularly well suited to orchards wherever air drainage is adequate. Sod cover, especially if the seeding mixture contains legumes, helps to control runoff and to hold plant nutrients.

CAPABILITY UNIT IIIe–1

In this unit are deep, well-drained, sloping or rolling, friable soils that have been developed over, or strongly influenced by, limestone. Erosion has been active, but the soils hold moisture and plant nutrients well and are fertile and productive. The soils of this unit are—

Duffield silt loam, 8 to 15 percent slopes, moderately eroded.
Dunmore cherty silt loam, 8 to 15 percent slopes, moderately eroded.
Etowah gravelly loam, 8 to 15 percent slopes, moderately eroded.
Etowah silt loam, 8 to 15 percent slopes, moderately eroded.
Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, moderately eroded.
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded.
Hagerstown silty clay loam, 8 to 15 percent slopes, moderately eroded.
Westmoreland channery silt loam, 10 to 20 percent slopes, moderately eroded.

These soils occur throughout the limestone valley and in scattered areas in the western part of the county. There are about 13,100 acres, or 4.4 percent of the county.

The soils of this capability unit resemble, in many ways, those of capability units I–1 and IIe–1, but they are steeper and need more careful management to control erosion. Many of the areas are small, and they lie within fields of more moderate topography. They tend to be farmed with the same rotation and management that are employed on more gently sloping soils. The soils of this capability unit, however, need longer rotations with fewer years in clean-tilled crops; they need contour farming in narrower strips; and they need more careful disposal of water than the soils of capability units I–1 and IIe–1.

The principal crops on these soils are corn, small grains, hay, and pasture; few areas remain in woodland. The 3-year rotation that is used on the more gently sloping soils is not protective enough to control erosion. Corn and a small grain followed by only 1 year of hay leaves the soil exposed too much of the time. A 4-year or 5-year rotation consisting of corn, a small grain, and 2 or 3 years of hay, is much more suitable. If hay, especially alfalfa, can be grown for 4 or more years after corn and small grain, or after corn, the degree of soil protection is still better.

Strips for the rotation of crops should be narrow and carefully laid out on the contour or on a slight grade. Disposal of water needs to be more carefully done than on similar soils of lesser slopes. Drainageways must be more carefully and heavily sodded, must receive more careful and frequent maintenance, and must have more durable and safer outlets. As with all soils, fertility and good tilth must be maintained by proper fertilization and cultivation and other management practices.

The soils of capability unit IIIe–1 are good soils, and under good management they are, and will remain, productive. Average yields are somewhat less than on soils of capability units I–1 and IIe–1 but are better than on most of the other capability units of class III.

CAPABILITY UNIT IIIe–4

This unit consists of deep, well-drained, sloping or somewhat rolling soils that have not been significantly influenced by limestone. The soils are like those of capability units I–4 and IIe–4, but they are more sloping and, hence, their use is more strongly limited by the hazard of erosion. The soils of this unit are—

Braddock and Thurmont gravelly loams, 8 to 15 percent slopes, moderately eroded.
Edgemont and Laidig channery loams, 5 to 20 percent slopes, moderately eroded.
Fauquier channery loam, 10 to 20 percent slopes, moderately eroded.
Fauquier silt loam, 10 to 20 percent slopes, moderately eroded.
Highfield gravelly loam, 10 to 20 percent slopes, moderately eroded.
Holston gravelly loam, 8 to 15 percent slopes, moderately eroded.
Holston silt loam, 8 to 15 percent slopes, moderately eroded.
Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded.
Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded.
Murrill silt loam, 8 to 15 percent slopes, moderately eroded.
Myersville channery loam, 10 to 20 percent slopes, moderately eroded.
Myersville silt loam, 10 to 20 percent slopes, moderately eroded.
Thurmont gravelly loam, 8 to 15 percent slopes, moderately eroded.
Waynesboro gravelly loam, 8 to 15 percent slopes, moderately eroded.

These soils are chiefly on uplands and terraces throughout the county, except in the limestone valley. Some of them lie along the fringes of the valley. They are ex-

tensive and occupy about 16,450 acres, or 5.6 percent of the county. These soils are similar, except for stronger slopes, to the soils of capability units I–4 and IIe–4, but they need more careful management and protection.

Many areas of these soils are small, and many of them join the similar, but more gently sloping, soils. Many fields, however, consist almost entirely of these soils. The slopes tend to be somewhat longer in Pleasant Valley, for instance, than in the limestone valley.

Because of the slope and the risk of erosion, rotations need to be longer and water disposal needs to be done with more care than on soils of capability unit IIe–4. More of the land should be in hay or pasture. The kinds of crops are the same as those suited to soils of capability unit IIe–4. There are large areas of orchards.

The usual 3-year rotation is followed by many farmers, but it is not likely to protect and maintain the soil well enough. A rotation that is 5 years in length is preferred for the soils in this capability unit. A 4-year rotation, with 2 years of hay, would be better than the simple 3-year rotation. More land should be in grass-clover pasture. Hay sod can also be used for pasture in part of the rotation. In some way there should be a decrease in the rotation cycle of the time the soil is exposed to erosion. If these soils are not protected better than they have been, they will eventually lose much of their productiveness. Already some areas, once in capability unit IIIe–4, are now in capability units IVe–3, VIe–2, or even VIIe–2, because they were damaged by erosion.

Yields are fairly good, but these soils will need better management than they have received in the past if their productivity is to be increased or even maintained.

CAPABILITY UNIT IIIe–5

This unit consists of somewhat droughty, gently sloping to strongly sloping, gravelly and sandy soils. The soils are rather severely limited by the hazard of erosion when they are cultivated. The soils of this unit are—

Holston gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.
Murrill gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.
Waynesboro gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.

These soils occur in many parts of the county outside of the limestone valley. They occupy about 1,700 acres, or six-tenths of 1 percent of the county.

These soils, in many ways, are like those in capability unit IIs–2, but they are more strongly sloping and have been moderately eroded. The soils are sandy and tend to be droughty. The risk of additional erosion, however, is the hazard that dominates their capability classification. The subsoil is generally finer textured than the surface layer, although both are sandy and gravelly. Fertility is rather low, and the soils tend to dry out more quickly than do the finer textured soils.

The usual farm crops are grown on these soils. Some areas are used for orchards. The soils need fertility improvement, water conservation, and, of course, control of erosion. The cropping system may include a small grain, but it does not need to do so; corn 1 year and hay 2 to 4 years is a fairly common rotation. Early vegetable crops should do well because the soils are well aerated and easily worked. Without irrigation, the vegetable crop should be one that will be harvested before the summer drought sets in. With supplemental irrigation, a longer growing season is possible. Fertilizer is greatly needed, and lime should be used judiciously. Information about the kind and amount of fertilizer and lime the soil needs can be obtained from testing the soil, a service that is available through the county agent's office.

CAPABILITY UNIT IIIe–6

This unit consists of only one soil—Terrace escarpments. This soil is on well-drained terraces and bottom lands that have short, irregular, and, in some places, steep slopes that are subject to serious erosion if they are not protected. Some areas are subject to occasional flooding.

Small areas of this soil are in narrow strips throughout the county wherever there are flood plains and terraces. These narrow strips are on the sides of draws or in small ravines that cut through terraces or flood plains; on short, sharp slopes between one level of a flood plain and another; or on fringes of terraces and flood plains where they adjoin steep uplands. The total area of this land is about 350 acres, or a little more than one-tenth of 1 percent of the county.

The cropping system used on this soil should be much the same as for soils of capability unit I–6, except that a crop rotation should contain more years in hay, pasture plants, or other close vegetative cover. The steepest areas should be in close-growing vegetation a great deal of the time. Such areas are particularly well suited to permanent meadow strips, even on bottom lands where most of the adjoining soils are in corn or some other crop. Careful protection of these areas will help protect the soils on adjacent bottom lands.

CAPABILITY UNIT IIIe–10

In this unit are sloping to strongly sloping, well-drained soils that are moderately deep over acid shale or mica schist and that have been moderately eroded. The soils of this unit are—

Calvin channery loam, 10 to 20 percent slopes, moderately eroded.
Talladega gravelly silt loam, thick solum variant, 0 to 20 percent slopes, moderately eroded.

These soils occur in the extreme eastern and extreme western parts of the county, but not in the limestone valley. They occupy about 2,900 acres, or 1 percent of the county.

The soils of this capability unit are similar to those of capability unit IIe–10, but they are steeper. Both have been moderately eroded. These soils are somewhat droughty. Their moisture-supplying capacity is low or moderate, and the growth of crops is hindered during long dry periods.

The soils are used for most of the common crops grown in the county. They are generally not good for alfalfa, because of their shallow depth, low fertility, and strong acidity. Wherever they have adequate air drainage, they appear to be fairly well suited to tree and berry fruits.

A crop rotation needs to be longer on these soils, with more years of hay or other close-growing crops, than on the soils of capability unit IIe–10. Soil-conserving measures are needed, and pastures should be well managed and not overgrazed. The 4-year and 5-year rota-

599553—62——6

tions that contain extra years of hay will be much more effective than the common 3-year rotation of corn, grain, and hay. If these soils are properly limed and fertilized, fairly good clover, mixed hay, and pasture can be grown. Even with the best cropping systems and management, however, these soils are not highly productive. Yields can be increased greatly with good management, but farmers should not expect yields that are obtainable on some of the better soils.

Tillage and farming operations should be on the contour, with fairly narrow strips of a row crop or grain. Water-conserving terraces can be built in some places. As much of the runoff as possible should be spread on meadow strips, so that most of the moisture can get back into the soil. Some runoff is probably unavoidable, and this should be channeled through well-protected drains and outlets.

Green-manure crops and cover crops are especially valuable on soils of this capability unit. They will help to maintain or increase fertility. Animal manure and crop residue are also needed. Pastures should be well established before they are grazed, and grazing should be regulated and not overdone. Control of weeds is especially important in pastures. As a rule, weeds can be controlled by seasonal mowing.

CAPABILITY UNIT IIIe–13

This capability unit consists of eroded, sloping or strongly sloping soils that have a tight subsoil that restricts drainage. Surface drainage is rapid, but internally the soils are only moderately well drained. The soils of this unit are—

Buchanan gravelly loam, 8 to 15 percent slopes, moderately eroded.
Landisburg cherty silt loam, 8 to 25 percent slopes, moderately eroded.
Monongahela gravelly loam, 8 to 15 percent slopes, moderately eroded.
Monongahela silt loam, 8 to 15 percent slopes, moderately eroded.
Trego gravelly silt loam, 3 to 15 percent slopes, moderately eroded.

These soils are in all parts of the county, except the limestone valley. They commonly occur in small, scattered areas. The total area is about 1,300 acres, or four-tenths of 1 percent of the county.

These soils are limited by the hazard of erosion and by wetness that is caused by impeded drainage. They are not particularly fertile, so neither present nor potential production is very high. The soils are suitable for cultivation, but they are used more for pasture or for mixed hay than for tilled crops. Some corn is grown, but little small grain. Alfalfa is not well suited and tends to heave in winter and spring. These soils are not well suited to vegetable crops or orchards. Most areas of these soils, in the agricultural parts of the county, are used for pasture and meadow. In the mountainous areas, they are mostly still in forest. None of the soils is in the major valleys of the county.

The soils of this capability unit are intermediate in many of their characteristics. They are neither well drained nor poorly drained and neither level nor very steep. They are seldom free of the risk of erosion, but few of the areas have been severely eroded. Some of the soils are rather low in fertility, and none are highly fertile. Therefore, they need several kinds of management, in some degree, at the same time.

Among their requirements, and perhaps the one of most importance, is the prevention of further losses of soil. Control of erosion and improvement of drainage can well go together. Runoff from adjacent higher areas should be intercepted and diverted around these soils if feasible. Otherwise, runoff should be conducted in strongly sodded waterways through the areas. Certain very wet spots can be partially drained by V-type ditches that discharge into the main drains. Tile drains are not usually recommended, because most of the soil areas are not deep enough over the tight subsoil for tile to work effectively. Contour tillage and, in some places, strip-cropping can be used on the strongly sloping areas to help control runoff.

These soils should be plowed and tilled only at long intervals; generally, the less they are disturbed the better. No machinery should be used on them, and no grazing should be allowed when the surface layer is saturated with water. This would puddle and compact the soil and make it more difficult to drain and manage. Neither hay crops nor pasture will be produced economically or in adequate amounts without attention to soil fertility. Unless these soils are properly managed and conserved, they will deteriorate progressively until they are of little use for any purpose.

CAPABILITY UNIT IIIe–26

The soils of this capability unit are sloping to fairly steep and are rather severely limited by the hazard of erosion. They contain pieces of chert and are underlain by cherty limestone. There are only two soils in this unit—

Elliber cherty loam, 12 to 25 percent slopes, moderately eroded.
Frederick cherty silt loam, 8 to 15 percent slopes, moderately eroded.

These soils are on the sides of ridges in the western part of the county. They amount to about 1,400 acres, or nearly one-half of 1 percent of the county.

The soils of this capability unit are like those of capability unit IIe–26, but they are more strongly sloping and their erosion hazard is more severe. Some areas are still in forest and some are used for general farming, but their most important use is for orchards. The soils are deep, readily permeable, and have a fairly high moisture capacity. They are not so readily erodible as many soils that have similar slopes. Air drainage on most of them is very good.

For general crops, long rotations should be used and the crops grown in contour strips. Orchards should also be planted on the contour, and there should be a well-kept ground cover between trees. Although the fertility may be at least moderately good, special attention should be given to the potash level in orchards and to the phosphate level for all crops.

Much of the rainfall probably will be absorbed by these soils. Runoff must be disposed of carefully to prevent erosion. Many cultivated areas have a blanket of chert fragments on the surface, which gives some protection to the soil. Close-growing vegetation will augment the protection against erosion. This combination, together with contour farming, should provide adequate control of runoff and erosion.

CAPABILITY UNIT IIIe–30

This capability unit consists of shallow to deep, heavy-textured, well-drained, gently to moderately sloping soils that are underlain by limestone. The soils have a fine-textured surface layer that is thin or very thin because of erosion. Plowing to a normal depth turns up part of the heavy, intractable subsoil, which tends to become puddled and cloddy. The fine-textured surface layer and the severe hazard of erosion make these soils difficult to manage. The soils of this unit are—

Benevola clay loam, 8 to 15 percent slopes, moderately eroded.
Corydon clay loam, 3 to 8 percent slopes, moderately eroded.
Frankstown and Duffield channery silt loams, 0 to 8 percent slopes, severely eroded.
Hagerstown clay loam, 3 to 8 percent slopes, severely eroded.
Hagerstown clay loam, 8 to 15 percent slopes, moderately eroded.

These soils are in spots throughout the limestone valley. There are only 1,400 acres, which is less than half of 1 percent of the county.

The soils of this capability unit are like those of capability units IIs–1 and IIe–19, except that they are more strongly sloping and some are severely eroded. They are finer textured than the soils of capability unit IIIe–1. Because of the slope, even where there has been only moderate erosion, the surface layer in most places is rather thin. When the soil is plowed, some of the finer textured subsoil is almost always mixed with the clay loam or silt loam surface layer.

Because of their texture, these soils are more difficult to plow and to manage than are those of capability unit IIIe–1. The soils become puddled and clod easily, and a good seedbed is difficult to prepare. These soils should receive large amounts of organic matter, either as animal manure or as plant residues. This will help prevent puddling and the formation of clods and will make the soil more easily workable over a somewhat wider range of moisture content.

Except for the differences because of texture of the surface layer, the soils of this capability unit can be used and managed much the same as those of capability unit IIIe–1. Whenever sod crops can be grown in preference to clean-tilled crops, the chances of maintaining good tilth will be improved.

CAPABILITY UNIT IIIe–31

This capability unit consists of sloping to strongly sloping, somewhat excessively drained soils that are shallow to moderately deep over shale or sandstone materials, which have been somewhat influenced by lime. The soils are like those of capability unit IIe–11, but they are more strongly sloping and have a more severe hazard of erosion. The soils of this unit are—

Litz channery loam, 10 to 20 percent slopes, moderately eroded.
Litz shaly loam, 0 to 10 percent slopes.
Litz shaly loam, 3 to 10 percent slopes, moderately eroded.
Litz-Teas channery silt loams, 3 to 15 percent slopes, moderately eroded.

These soils are in the western part of the county and on some of the ridges within the limestone valley. They amount to about 2,200 acres, a little less than eight-tenths of 1 percent of the county.

The soils of capability unit IIIe–31 contain many flat fragments of sandstone or large fragments of shale, even in the surface layer. The fragments are especially numerous where the soils have been plowed and the thin, natural surface layer has been mixed with the more channery subsoil.

These soils are used for general farming and, to some extent, for orchards. Fairly large areas are still in forest. Although these soils are shallow and droughty, they are fairly fertile and productive. Erosion is probably more of a hazard than droughtiness. The soil should be managed in long rotations that include cover crops most of the time. Farming should be on the contour. The soils are readily permeable to water, but their capacity for holding water is low. Consequently, there is usually considerable runoff during and after heavy rains. Rills develop readily, and, unless checked, will enlarge into gullies. Diversion terraces and heavily sodded waterways are needed to control runoff.

Supplemental irrigation, where it can be done, would benefit the crops on these soils. Some irrigation is done in orchards on Litz soils in the Hancock area. Irrigation would have to be of the sprinkler type, and the water should be applied with great care. Water is not readily available for many of the areas of these soils.

CAPABILITY UNIT IIIe–32

This capability unit consists of sloping to strongly sloping, well-drained soils that are moderately deep over acid shale or sandstone and have a severe hazard of erosion. The soils are like those of capability unit IIs–7, except that the hazard of erosion is more of a management problem than is droughtiness or low fertility. The soils of this unit are—

Berks channery loam, ridges, 10 to 20 percent slopes, moderately eroded.
Berks silt loam, ridges, 10 to 20 percent slopes, moderately eroded.
Calvin-Berks channery loams, 10 to 20 percent slopes, moderately eroded.

These soils are mostly in the far western part of the county, but some are in the vicinity of Conococheague Creek. They amount to about 6,200 acres, or 2.1 percent of the county.

These soils are similar to the soils of capability unit IIIe–31, but, because there has been no influence of lime they are somewhat less fertile and productive, even though in most areas the soil is a little deeper over the bedrock.

Although large areas are still in forest, some of the acreage is used for general farming and some for orchards. Practices to combat erosion and droughtiness should be essentially the same as for capability unit IIIe–31, but more careful attention is needed for the maintenance and improvement of fertility. Fertilizer is needed in large amounts for most crops. Additions of organic material are especially helpful. The soils should be limed and fertilized, as indicated by soil tests. These soils cannot be made highly productive, but good management will produce fairly good returns from them.

CAPABILITY UNIT IIIe–44

This capability unit consists of deep, well-drained, moderately sloping, severely eroded soils. In spite of the severe erosion that has occurred, there is still a great enough depth of soil for many crops, particularly deep-rooted crops that can draw on the usually adequate

moisture supply in the deep subsoils. These soils have not been influenced by lime. They are—

Myersville channery silt loam, 3 to 10 percent slopes, severely eroded.
Waynesboro gravelly loam, 3 to 15 percent slopes, severely eroded.

These soils are mostly in the Pleasant Valley section and on some old terraces of the Potomac River. They occupy about 500 acres, or two-tenths of 1 percent of the county.

These soils became eroded when they were not well managed. Adequate erosion control measures should prevent further deterioration, and the soils can be cultivated regularly if they are managed properly.

Intensive practices to check further erosion are needed. Farming should be on the contour, and special care is needed to dispose of excess water. Strips of crops should be narrow, and not more than one strip in four should be clean tilled. A hay crop should be kept on the land at least 2 years, and preferably longer. Cover crops should be grown and turned under for green manure. Green-manure crops, along with large amounts of animal manure, will improve surface structure and tilth, enable water to penetrate more rapidly, and decrease the runoff. The surface layer will also be more friable and easily tilled.

CAPABILITY UNIT IIIw-1

This unit consists of poorly drained, silty soils of flood plains, foot slopes, terraces, or depressions. They have not been influenced by lime. The soils of this unit are—

Atkins silt loam.
Brinkerton silt loam, 0 to 8 percent slopes.
Rohrersville silty clay loam, 0 to 8 percent slopes, moderately eroded.
Tyler silt loam, 0 to 8 percent slopes.
Wehadkee silt loam.

The Atkins and the Wehadkee soils occur on flood plains and are subject to occasional or frequent flooding. The other soils occur in upland depressions, on low foot slopes, or on old river terraces, and usually are not subject to flooding. These soils are in all parts of the county, except in the limestone areas. There are about 1,900 acres, or nearly seven-tenths of 1 percent of the county.

These are some of the wettest soils in the county. They are saturated during most of the winter and spring and frequently at other times of the year after heavy rains.

Many areas have been cleared, but in other places there are growths of willows, alders, birches, and other water-tolerant trees. The cleared areas are used chiefly for grazing. With adequate drainage, they can be made suitable for cultivation. The Brinkerton and Rohrersville soils in this unit have more continuing limitations after drainage than the other soils. Under good management, some fairly good crops are produced, especially on the Rohrersville silty clay loam. Hay crops, including some soybeans, and late corn are the most common crops.

Drainage can be improved by the use of V-type ditches; tile is generally too expensive for the returns that can be expected. Diversion terraces will partly protect the soils from runoff. Danger of flooding can be reduced in some places by cleaning and straightening channels and by deepening some of them. Cleaned and straightened banks should, of course, be sodded to help protect them from cutting.

Hay and pasture are good uses for these soils. Corn for silage can also be grown. Prevention of overgrazing and trampling while the soils are wet is an important item in their management. Pastures should be grazed only when the surface layer is dry enough that it will not be puddled or compacted.

CAPABILITY UNIT IIIw-2

The only soil in the county in this capability unit is Melvin silt loam. It is a poorly drained soil of the flood plains and has been strongly influenced by limestone. Normally, it is flooded only occasionally.

This soil occurs on flood plains wherever sediment from limestone areas has been deposited. Most of the areas, but not all, are within the limestone valley. There are about 2,000 acres, or seven-tenths of 1 percent of the county.

The most common use for this soil, without artificial drainage, is pasture. Areas that can be drained may be used for corn, hay, and pasture. The soil is of good fertility and is productive when properly managed. Management should be much the same as that of soils in capability unit IIIw-1; the yields and economic returns should be greater.

CAPABILITY UNIT IIIs-2

The soils of this unit are well drained to excessively drained and are very shallow or shallow over bedrock of hard shale or mica schist. The Corydon soil is shallow over limestone. Slopes are gentle to moderate, and, although there is some erosion hazard, the thinness, droughtiness, and low fertility of the soil are more important limitations than the risk of erosion. The soils of this unit are—

Berks shaly silt loam, 0 to 8 percent slopes.
Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded.
Calvin shaly loam, 0 to 10 percent slopes, moderately eroded.
Calvin-Montevallo shaly loams, 0 to 10 percent slopes, moderately eroded.
Corydon clay loam, 0 to 3 percent slopes.
Hazel channery silt loam, 0 to 10 percent slopes, moderately eroded.
Montevallo shaly loam, 0 to 10 percent slopes, moderately eroded.

These soils occur in several parts of the county. They amount to about 5,600 acres, or 1.9 percent of the county.

These soils are shallow and droughty, of low fertility, and strongly to very strongly acid. They are suitable for cultivation, but very careful management that includes conservation of moisture, improvement of fertility, and the control of erosion are necessary for any reasonable production. There is not enough soil depth for deep-rooted crops; in places bedrock is within a few inches of the surface, and generally it is within 2 feet of the surface. Close-growing crops should be included in the rotation and clean-tilled crops grown no more than necessary. Tillage encourages erosion, and there is little soil to lose. Hay crops and pasture protect the soil, but they produce little forage during the dry summer weather. Under the best management, pasture produces fairly well in spring and in autumn if there is sufficient moisture.

There are some orchards on these soils. They can be managed without erosion if kept in sod, but production probably will be low in comparison to that on the better orchard soils. Irrigation should be especially helpful for

orchards, annual crops, and for pasture, wherever there is water that can be developed and used economically.

Subsoiling, or chiseling, is done on some of these soils, but not on the Corydon or Hazel soils, which are underlain by very hard rock. A tractor-drawn tool is used to cut vertically into and through the soil, and as deep into the shale rock as the available tools and power permit. The depth of penetration may average as much as 2 feet, but in some areas it is less. The shattered shale permits some surface soil, organic matter, nutrients, and especially water to penetrate more readily than before. The root zone is thus deepened; the amount of water and nutrients available for plants is increased; and the amount of runoff and erosion are reduced.

CAPABILITY UNIT IVe–1

This capability unit consists of moderately deep and deep, rolling to hilly, well-drained soils that are underlain by, or were strongly influenced by, limestone. These soils have been moderately to severely eroded, and are very severely limited in use by the hazard of erosion. The soils of this unit are—

Benevola clay loam, 8 to 15 percent slopes, severely eroded.
Corydon clay loam, 8 to 15 percent slopes, moderately eroded.
Duffield silt loam, 8 to 25 percent slopes, severely eroded.
Duffield silt loam, 15 to 25 percent slopes, moderately eroded.
Etowah gravelly loam, 15 to 25 percent slopes, moderately eroded.
Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, moderately eroded.
Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, severely eroded.
Hagerstown clay loam, 8 to 15 percent slopes, severely eroded.
Hagerstown clay loam, 15 to 25 percent slopes, moderately eroded.
Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded.
Hagerstown silty clay loam, 15 to 25 percent slopes, moderately eroded.
Westmoreland channery silt loam, 3 to 20 percent slopes, severely eroded.
Westmoreland channery silt loam, 20 to 30 percent slopes, moderately eroded.

These soils are scattered, generally in small areas, throughout the limestone valley and in a few spots in the western part of the county. There are about 3,600 acres, or 1.2 percent of the county.

Partly because they developed in material derived from or influenced by limestone, these soils are productive. They lose productivity rapidly if they are cultivated too frequently. The slopes are too steep to be used for annual tilled crops without serious risk of erosion. Some of the soils already have been severely eroded.

The soils of this capability unit have been and are being used for general crops, as a rule in fairly long rotations. Some areas are in pasture, and they are well suited to that use. The soils are much better suited to close-growing hay crops than to clean-tilled crops. Considerable corn is grown, but generally no other row crops. Some small grains are grown, and there are orchards on these soils in the western part of the county.

Because many areas of these soils are small, the tendency has been to manage them along with the surrounding, more gently sloping soils. It is difficult and sometimes impractical to have a separate cropping system for these small areas. Many areas of these soils, however, are in long, narrow strips approximately at right angles to the slope of the land. These strips are well suited to permanent hay that will not require rotation, and they need very little plowing or other tillage. It is much better to have a strip of alfalfa or other permanent hay within a cultivated field than to try to include steep or severely eroded soil in the rotation itself.

If corn or any other clean-cultivated crop must be planted on these soils, it should be only for 1 year in 5 or more years. Corn should be grown in contour strips with perhaps a terrace below or above it, or both, if the lay of the land permits. If the sod strips are kept as permanent meadows, they need to be plowed and replanted only when the sod becomes thin.

Although these soils are fertile, they need care to keep them productive. Excess water must be very carefully disposed of because of the danger of gullying or sheet erosion.

CAPABILITY UNIT IVe–3

In this unit are rolling to hilly, deep, well-drained soils that have not been appreciably influenced by limestone, but are severely limited in use by the hazard of erosion. These soils are like those in capability unit IIIe–4, but they are steeper. The soils of this unit are—

Braddock and Thurmont gravelly loams, 15 to 25 percent slopes.
Edgemont and Laidig channery loams, 20 to 35 percent slopes, moderately eroded.
Fauquier channery loam, 20 to 35 percent slopes, moderately eroded.
Fauquier silt loam, shallow, 3 to 20 percent slopes, moderately eroded.
Highfield gravelly loam, 20 to 35 percent slopes, moderately eroded.
Holston gravelly loam, 15 to 25 percent slopes, moderately eroded.
Laidig gravelly loam, 15 to 25 percent slopes, moderately eroded.
Murrill gravelly loam, 15 to 25 percent slopes, moderately eroded.
Myersville channery loam, 20 to 30 percent slopes, moderately eroded.
Waynesboro gravelly loam, 15 to 25 percent slopes, moderately eroded.

The soils of this unit are present in many parts of the county. The total area is about 5,000 acres, or 1.7 percent of the county.

Some of the areas in this capability unit remain in forest. Most of the others are in hay crops or pastures. The same crops are grown as on most of the adjacent soils, which are generally of capability units IIe–4, IIIe–4, or IIIe–44, with scattered spots of soils of I–4. Orchards are fairly common on some of these soils, particularly north and east of Smithsburg.

These soils are suitable for long rotations in which they are clean cultivated only 1 year in 5 or 6 years. Management practices are similar to those for the soils in unit IVe–1. The great difference between these two capability units is that the soils of this unit are generally less fertile and productive than those of unit IVe–1. But even if they do not produce yields so good as those on the limestone-influenced soils, they respond well to good management. Most of these soils are especially well suited to grass-clover pasture.

CAPABILITY UNIT IVe–5

This capability unit consists of somewhat droughty, sloping to rolling, moderately or severely eroded, gravelly and sandy soils that are severely limited by the hazard of further erosion. The soils of this unit are—

Holston gravelly sandy loam, 8 to 15 percent slopes, severely eroded.
Murrill gravelly sandy loam, 8 to 15 percent slopes, severely eroded.
Murrill gravelly sandy loam, 15 to 25 percent slopes, moderately eroded.
Waynesboro gravelly sandy loam, 8 to 15 percent slopes, severely eroded.
Waynesboro gravelly sandy loam, 15 to 25 percent slopes, moderately eroded.

These soils are on old terraces and on foot slopes mostly near the Potomac River. The total area is only 462 acres, a little less than two-tenths of 1 percent of the county.

Like the other soils of subclass IVe, these soils cannot be cultivated with safety except at long intervals. Rotations similar to those given for soils of capability units IVe–1 or IVe–3 can be used. However, the light, sandy soils of this capability unit are less productive because they are somewhat droughty and generally lower in supply of plant nutrients. If local climatic and other factors are favorable (air drainage is extremely important), the soils of this unit are fairly well suited to orchards.

Whatever the use, these soils must be protected from erosion. Liberal use of fertilizer and manure is needed for whatever crop is planted. Irrigation will increase yields greatly and is probably practical on orchards if water is available.

CAPABILITY UNIT IVe–9

In this capability unit are strongly sloping to hilly soils that have a tight subsoil that restricts internal drainage. External drainage is rapid. These soils have been moderately eroded and are severely limited by the hazard of further erosion. They are—

Buchanan gravelly loam, 15 to 25 percent slopes, moderately eroded.
Monongahela silt loam, 15 to 25 percent slopes, moderately eroded.

There are only a few scattered areas of these soils and they are in the western part of the county. They amount to 143 acres, or one-twentieth of 1 percent of the county.

These soils have excessive runoff during wet periods; rain or snowmelt water penetrate them very slowly, because of the tight subsoil. They are thus especially subject to erosion. The tight subsoil also causes the soil to remain very wet after normal, well-drained soils have dried enough that they can be tilled. Annual crops must be planted late, after normal seeding time.

For these reasons, if clean-tilled crops are grown, they should be grown in a long-time rotation with hay crops, or perhaps with rotation pasture. Pasture should not be grazed during wet weather, but should be held in reserve for drier times of the year. Pasture may not carry well through extremely dry weather, because the tight subsoil limits the moisture-supplying capacity.

These soils must be well managed or they will be severely damaged by erosion.

CAPABILITY UNIT IVe–10

This capability unit consists of strongly sloping to hilly, shallow to moderately deep soils that are underlain by acid shale and mica schist. The soils of this unit are—

Calvin channery loam, 20 to 30 percent slopes.
Calvin channery loam, 20 to 30 percent slopes, moderately eroded.
Chandler silt loam and channery silt loam, 10 to 20 percent slopes, moderately eroded.
Talladega gravelly silt loam, thick solum variant, 10 to 20 percent slopes, severely eroded.
Talladega gravelly silt loam, thick solum variant, 20 to 30 percent slopes.

These soils are in various parts of the county. They occupy about 1,670 acres, or six-tenths of 1 percent of the county.

The soils of this capability unit are shallow or moderately deep, and they contain many fragments of rock. Most of them are rather low in fertility and tend to be droughty during periods of low rainfall. They are all subject to a severe hazard of erosion. The severely eroded soils are less productive than the others.

A considerable part of the soils not moderately or severely eroded is still in forest. Most of these wooded areas are not large. They generally consist of blocks of trees or of woodlots on fairly steep slopes. The cleared areas are used mostly for hay crops or for pasture and some for tree and berry fruits. Enough corn and small grains are grown, or have been grown, to expose many areas of these soils to active erosion. Pastures are generally rather poor and overgrazed.

These soils should be used for tilled crops no more often than 1 year in about 5, and hay or pasture crops should be grown the rest of the rotation. More tree and berry fruits could be planted. Well-sodded and well-managed orchards are suitable for the soils in this capability unit.

Because of their limiting features, these soils must be especially well managed if production is to be maintained on them. Good management of pasture is especially needed because these soils cannot normally produce as much grazing as can the deeper and better soils. The chance of overgrazing, therefore, is greater.

CAPABILITY UNIT IVe–26

This unit consists of rolling, well-drained soils on cherty limestone. The soils are very severely limited by the hazard of erosion. They are—

Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded.
Frederick cherty silt loam, 15 to 25 percent slopes, moderately eroded.

These soils are on strongly sloping ridges in the western part of the county. They occupy only about 1,200 acres, or four-tenths of 1 percent of the county.

These soils are so severely eroded or so strongly sloping that they are very severely limited for use for cultivated crops. Possibly their most intensive, safe use would be for orchards, which need to be kept in sod or in cover crops most of the time. Otherwise, they can be used for hay or for carefully controlled grazing. A clean-tilled crop should be grown only about once in 5 years.

Good management will prevent further excessive loss of soil. The soils of this unit are not so readily erodible as many others that have similar slopes. They are fairly open and porous, and the surface layer is generally fairly well paved with fragments of chert gravel, which minimizes the splashing effects of heavy rainfall. Any crops, and particularly orchards, should be planted and cultivated on the contour. Carefully constructed and maintained waterways and outlets should be installed wherever water tends to concentrate.

CAPABILITY UNIT IVe–31

This capability unit consists of rolling to hilly, somewhat excessively drained soils that are shallow over shale or sandstone and have been influenced by lime. The soils of this unit are very severely limited by the hazard of erosion. They are—

Litz channery loam, 10 to 20 percent slopes, severely eroded.
Litz shaly loam, 10 to 20 percent slopes, moderately eroded.
Litz-Teas channery silt loams, 8 to 15 percent slopes, severely eroded.
Litz-Teas channery silt loams, 15 to 25 percent slopes, moderately eroded.

The total area is about 1,800 acres, or six-tenths of 1 percent of the county.

These soils are shallower than those of capability unit IVe–10, but the shale and sandstone from which they have been developed were rich in lime. Also, the soils tend to be somewhat more naturally fertile than those of capability unit IVe–10.

Because these soils are so shallow, any cultivation, however limited, must be accompanied by intensive conservation measures. In most places there is only a little more than a foot of soil over the bedrock. When the soils are properly managed and protected, however, they are fairly productive. Yields would be greater if supplemental irrigation were available during dry periods.

A common use of these soils is for orchards, and this use is suitable and safe if the orchards are well sodded and otherwise protected. Clean-cultivated crops should be grown no oftener than once in about 5 years. Even then, planting and cultivation should be in contour strips, with all necessary precautions to check runoff and hold the soil.

CAPABILITY UNIT IVe–32

In this capability unit are rolling to hilly, somewhat excessively drained to excessively drained soils that are shallow or very shallow over acid shale or mica schist. These soils are very severely limited by the hazard of erosion and by droughtiness and low fertility. The soils of this unit are—

Berks channery loam, ridges, 10 to 20 percent slopes, severely eroded.
Berks channery loam, ridges, 20 to 30 percent slopes, moderately eroded.
Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded.
Berks silt loam, ridges, 10 to 20 percent slopes, severely eroded.
Berks silt loam, ridges, 20 to 30 percent slopes, moderately eroded.
Calvin shaly loam, 10 to 20 percent slopes, moderately eroded.
Calvin-Berks channery loams, 3 to 20 percent slopes, severely eroded.
Calvin-Berks channery loams, 20 to 30 percent slopes, moderately eroded.
Calvin-Montevallo shaly loams, 10 to 20 percent slopes, moderately eroded.
Hazel channery silt loam, 10 to 20 percent slopes, moderately eroded.
Montevallo shaly loam, 10 to 20 percent slopes, moderately eroded.

The total area of this unit is about 8,200 acres, or 2.7 percent of the county.

These soils are as shallow as those of capability unit IVe–31. They are more strongly acid and usually less productive. Although they are suitable for limited cultivation with proper precautions and good management, they are of such limited productivity that use other than for an occasional cultivated crop, hay and grazing, or orchards will probably give poor returns. Forested areas should remain in forest. Grazed areas should be protected carefully from overgrazing and cultivated areas used seldom for clean-tilled crops, but chiefly for hay.

CAPABILITY UNIT Vs–1

This unit consists of practically level, well-drained, very rocky soils. The rocks are chiefly outcrops of limestone. These soils cannot be cultivated regularly. If they are used for pasture or woodland, they are not subject to deterioration, because their chief limitation is rockiness. These soils have been mapped as one undifferentiated unit—

Hagerstown, Corydon, and Duffield very rocky silt loams, 0 to 3 percent slopes.

These soils are in scattered areas throughout the limestone valley. They amount to 424 acres, a little more than one-tenth of 1 percent of the county.

These soils are nearly level, fertile, well drained, and not significantly eroded. They are too rocky, however, for cultivated crops or for a normal rotation. Some patches could be used for corn or hay crops, but only by hand cultivation. Therefore, these soils are limited in use almost entirely to grazing or to woodland.

The maintenance of a vegetative cover of either pasture plants or trees will protect these soils from erosion. These rocky soils make excellent pasture, although either mowing or control of weeds with chemicals is more than normally difficult. In pasture the control of brush also may have to be a hand operation, but this will not be time consuming or difficult if it is repeated at regular intervals.

These soils are excellent for woodlots if the trees are protected from fire and from grazing. All of the local trees will do well if given a reasonably good chance.

CAPABILITY UNIT Vs–2

In this unit are nearly level or very gently sloping, stony and very stony soils, most of them well drained, that have not been affected by limestone. Regular cultivation is not practical, but the soils have practically no limitations other than their stoniness. Some spots are only moderately well drained, and a few areas may be occasionally temporarily flooded. The soils of this unit are—

Chewacla stony silt loam.
Edgemont and Laidig very stony loams, 0 to 5 percent slopes.
Highfield very stony loam, 0 to 5 percent slopes.
Pope stony gravelly loam.

Some areas of these soils are on nearly level ridgetops, and some are on narrow, stony flood plains. Most of the areas are on or adjacent to South Mountain. There are 415 acres, or a little more than one-tenth of 1 percent of the county.

These soils are not suitable for crops or for normal rotations because the surface layer is too stony. Stones, boulders, and some rock outcrops make up about 40 percent of the surface area. This is enough to prevent modern mechanized farmwork, although some row crops or hay could be produced by more primitive methods.

The chief difference between these soils and those of capability unit Vs–1 is that nearly all of the stones are loose and rounded, and of acid rock material; in unit Vs–1 they are ledges of limestone. The soils of this capability unit are also somewhat less fertile than those of capability unit Vs–1, and will generally yield less pasture forage or fewer woodland products. Pastures should be limed and fertilized, as needed, and weeds and brush should be controlled. Woodlands should be protected from burning and from grazing.

CAPABILITY UNIT VIe–1

This capability unit consists of rolling and severely eroded, or steep and moderately eroded, well-drained, deep soils that are underlain by limestone. The soils of this unit are—

Elliber cherty loam, 25 to 45 percent slopes, moderately eroded.
Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, severely eroded.
Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, moderately eroded.
Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded.
Frederick cherty silt loam, 25 to 45 percent slopes, moderately eroded.
Hagerstown clay loam, 15 to 25 percent slopes, severely eroded.
Hagerstown and Duffield silt loams, 25 to 45 percent slopes, moderately eroded.
Westmoreland channery silt loam, 20 to 30 percent slopes, severely eroded.

These soils are in all the limestone areas of the county. The total area is about 2,000 acres, or a little less than seven-tenths of 1 percent of the county.

These are fertile and productive soils, but they are too steep or have been too severely eroded to be used safely for cultivated crops. They might produce fairly good hay, but the crop would be difficult to cut and to cure. A much safer, and generally better, use is to keep the soils in permanent sod pasture or in woodland. Properly managed pastures, particularly if they are not overgrazed, can be among the better pastures of the county. Although the carrying capacity is not so great as on the soils of capability units I–1, IIe–1, IIIe–1, and IVe–1, it should be greater than on any other soils of class VI. The soils can also be safely used for woodland if protected from grazing and from fire.

CAPABILITY UNIT VIe–2

This capability unit consists of rolling and severely eroded, or steep and moderately eroded, well-drained, fairly deep soils that have not been appreciably affected by limestone. The soils of this unit are—

Edgemont and Laidig channery loams, 35 to 60 percent slopes, moderately eroded.
Holston gravelly loam, 8 to 25 percent slopes, severely eroded.
Holston gravelly loam, 25 to 45 percent slopes, moderately eroded.
Murrill gravelly loam, 8 to 25 percent slopes, severely eroded.
Murrill gravelly loam, 25 to 45 percent slopes, moderately eroded.
Murrill gravelly sandy loam, 15 to 25 percent slopes, severely eroded.
Myersville channery loam, 30 to 45 percent slopes, moderately eroded.
Myersville channery silt loam, 10 to 30 percent slopes, severely eroded.
Waynesboro gravelly loam, 15 to 25 percent slopes, severely eroded.
Waynesboro gravelly loam, 25 to 45 percent slopes, moderately eroded.

These soils are in scattered spots in many parts of the county. There are about 1,200 acres, or four-tenths of 1 percent of the county.

None of these soils can be cultivated without undue loss of soil, even with all the erosion control measures that could be feasibly carried out. Such crops as corn or oats could be grown, but only at the expense of losing the vegetation-supporting upper layers of soil.

Some of the less eroded areas are in forest. The areas now being cropped are continuing to deteriorate. Some of the areas are idle and not producing. Probably a larger acreage is in pasture than in any other use.

Pasture and woodland are the only really suitable uses for these soils. Bluegrass does well on most of the soils, and good pastures can be maintained with careful management. The chief precaution after sod is established is to prevent overgrazing. Livestock should be excluded from these pastures during any summer "brown-out" of the sod. The soil should be tested regularly and limed or fertilized as needed. Good pastures will not maintain themselves on these soils; it takes very good management to maintain them.

CAPABILITY UNIT VIe–3

In this unit are shallow soils that range from sloping and severely eroded to moderately steep and practically uneroded. The soils of this unit are—

Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded.
Calvin channery loam, 30 to 45 percent slopes.
Calvin shaly loam, 10 to 20 percent slopes, severely eroded.
Calvin shaly loam, 20 to 30 percent slopes.
Calvin-Montevallo shaly loams, 20 to 30 percent slopes, moderately eroded.
Chandler silt loam and channery silt loam, 20 to 30 percent slopes.
Hazel channery silt loam, 10 to 20 percent slopes, severely eroded.
Hazel channery silt loam, 20 to 30 percent slopes, moderately eroded.
Litz shaly loam, 10 to 20 percent slopes, severely eroded.
Litz shaly loam, 20 to 30 percent slopes, moderately eroded.
Litz-Teas channery silt loams, 15 to 25 percent slopes, severely eroded.
Litz-Teas channery silt loams, 25 to 45 percent slopes, moderately eroded.
Montevallo shaly loam, 10 to 20 percent slopes, severely eroded.
Montevallo shaly loam, 20 to 30 percent slopes, moderately eroded.
Talladega gravelly silt loam, thick solum variant, 20 to 45 percent slopes, moderately eroded.

These soils are shallower than the others of class VI. They occupy 7,600 acres, or 2.5 percent of the county.

There is little difference in necessary management between these soils and those of capability units VIe–1

and VIe–2. Because these soils are shallow, however, they tend to be more droughty. Thus, the greatest practical difference is in carrying capacity, particularly during hot, dry weather. Grazing animals should not be allowed on these soils during such periods. Row crops and small grains should not be grown because of the hazards of drought and erosion.

CAPABILITY UNIT VIw–1

This unit consists of only one poorly drained to very poorly drained soil mapping unit—Dunning and Melvin silty clay loams. This soil is subject to frequent serious damage by flooding or overflow. It occupies about 1,900 acres, or six-tenths of 1 percent of the county.

This soil should be kept in permanent vegetation, such as pasture or woodland. To be of much use as pasture, it needs artificial drainage. Diversions and waterways are needed to keep water from adjacent upland soils from spreading out on this soil. Surface drainage can be improved by V-type ditches at proper spacing. Spoil material should be spread away from the ditches, and the banks and slopes should be protected by sod. Ditches are especially needed to drain any abnormally wet spots. Tile drains might work well in some places, but the cost is likely to be more than the returns would justify.

This soil is also suitable for woodland; trees should be of species that tolerate wetness, unless artificial drainage is to be established.

CAPABILITY UNIT VIs–1

This unit consists of sloping to steep, well-drained, very rocky soils that are limited both by rockiness and by hazard of erosion. The rocks are outcrops of limestone. The soils of this unit are—

Corydon very rocky clay loam, 3 to 45 percent slopes, moderately eroded.
Duffield very rocky silt loam, 3 to 15 percent slopes.
Duffield very rocky silt loam, 8 to 45 percent slopes, moderately eroded.
Frankstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded.
Frankstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded.
Hagerstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded.
Hagerstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded.
Hagerstown very rocky silty clay loam, 3 to 15 percent slopes, moderately eroded.
Hagerstown very rocky silty clay loam, 15 to 45 percent slopes, moderately eroded.

These very rocky soils are extensive throughout the limestone areas of the county. Altogether, they occupy about 25,500 acres, or 8.6 percent of the county.

The soils of this capability unit are much like those of capability unit Vs–1, except that they are steeper or have been more severely eroded. Because of the rockiness, slope, and risk of erosion, cropping these soils would be entirely impractical. Nearly all of the areas have been cleared, and most of them are used for pasture. Erosion was generally a result of overgrazing, which destroyed some of the soil protecting sod between the outcrops of limestone. The soils are naturally fertile, however, and responsive to treatment so that sod can be readily reestablished and maintained with proper management.

Where practical, some of the rock should be removed. Bluegrass or other grasses along with suitable clovers will make excellent pasture sod. Lime may be needed, and some fertilizer almost certainly will be needed. These practices, along with control of weeds and the prevention of overgrazing, should result in very good pastures on soils that are suitable for this use but for little else except woodland.

CAPABILITY UNIT VIs–2

This capability unit consists of gently sloping to moderately steep, very stony soils that are well drained and not affected by limestone. The uses of these soils are limited both by stoniness and by some hazard of erosion. The soils of this unit are—

Edgemont and Laidig very stony loams, 5 to 35 percent slopes.
Fauquier very stony loam, 5 to 35 percent slopes.
Highfield very stony loam, 5 to 30 percent slopes.
Laidig very stony loam, 8 to 25 percent slopes.
Myersville very stony loam, 3 to 30 percent slopes, moderately eroded.

These soils are mostly on South Mountain and on Elk Ridge, although some areas are in the western part of the county. There are about 16,500 acres, or 5.6 percent of the county.

Stoniness is the chief limiting characteristic of these soils. If they were not stony, the gently and moderately sloping soils would be suitable for cultivation. Most of the areas are forested, but some are cleared and used for pasture. Practically none of the cleared land is cultivated. A good use for these soils is woodland, and the areas now forested should probably remain so. Forests yield timber and give good protection for watersheds and for wildlife areas.

Cleared areas make fairly good pasture, however, if they are properly managed. Where practical, some of the stones should be removed, and the soils should be treated with appropriate amounts of lime and fertilizer and seeded to bluegrass or orchardgrass with one or more of the clovers. Overgrazing of pastures should be avoided, particularly before grasses and clovers are well established. Even after sod is established, overgrazing is the greatest hazard. Control of weeds and brush may be somewhat difficult on these soils, but it must be carried out if pastures are to be kept in first-class condition.

Areas of cleared land, not intended for pasture, should be reforested. All forests should be protected from grazing; protection of newly planted or restocked forests is particularly needed. Fires should be prevented also.

CAPABILITY UNIT VIIe–1

This unit consists of very steep or very severely eroded soils that are underlain by limestone. The soils of this unit are—

Elliber cherty loam, 45 to 55 percent slopes.
Eroded land, limestone materials.
Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, severely eroded.

These soils are in the limestone valley and on some ridges in the western part of the county. The total area is about 800 acres, a little less than three-tenths of 1 percent of the county.

Although these very steep soils or very severely eroded soils are inherently fertile, no attempt should be made to use them for crops or pasture. Forested areas should remain forested, and all cleared areas should be reforested. Obtaining a stand of seedlings may be difficult, but, once the trees are established, they should make fairly rapid growth. Timber operations may be difficult, and economically they may not be practical. The establishment of permanent cover, however, whether economically feasible or not, will furnish watershed protection and at least some possibility of return. All forested areas should be fenced to keep grazing animals out. These forested areas make good wildlife cover, especially if they are bordered by hedgerows of seed-producing grasses or shrubs.

CAPABILITY UNIT VIIe-2

This unit consists only of very severely eroded land types. The two general kinds of land are—

Eroded land, greenstone materials.
Eroded land, sandstone and quartzite materials.

There are 322 acres of this capability unit. This is one-tenth of 1 percent of the county.

These eroded lands have been cleared and farmed, and the farming has resulted in exceptionally severe erosion. The soils are acid to very strongly acid, unlike those of capability unit VIIe-1. These areas should not be cultivated; they are too eroded and most of them are too steep even for grazing. Thus, they are of little use in agriculture, except for forests, watershed protection, and wildlife cover. Forests probably will be poor. Some areas may reforest themselves if they are fenced and protected from grazing and fire; others could be replanted. With proper protection, such reforested areas are likely to become more valuable than they possibly could under any type of farming.

CAPABILITY UNIT VIIe-3

This unit consists of very steep or severely eroded, shallow soils. The soils of this unit are—

Berks soils, ridges, 20 to 45 percent slopes, severely eroded.
Berks soils, ridges, 30 to 60 percent slopes.
Calvin channery loam, 45 to 60 percent slopes.
Calvin shaly loam, 30 to 45 percent slopes.
Calvin-Berks channery loams, 30 to 60 percent slopes, moderately eroded.
Calvin-Montevallo shaly loams, 20 to 45 percent slopes, severely eroded.
Calvin-Montevallo shaly loams, 30 to 60 percent slopes.
Eroded land, shale and schist materials.
Hazel channery silt loam, 20 to 30 percent slopes, severely eroded.
Hazel channery silt loam, 30 to 45 percent slopes.
Litz shaly loam, 20 to 30 percent slopes, severely eroded.
Litz shaly loam, 30 to 45 percent slopes, moderately eroded.
Litz shaly loam, 30 to 45 percent slopes, severely eroded.
Litz shaly loam, 45 to 60 percent slopes.
Montevallo shaly loam, 20 to 30 percent slopes, severely eroded.

These soils are in almost all parts of the county, except in the limestone valley. Altogether, they occupy about 11,400 acres, slightly less than 4 percent of the county.

These soils are not suitable for crops. Because of their many adverse characteristics, they cannot be recommended for either hay or pasture. Some of the least eroded, very steep spots are still in forest. All the severely eroded and very severely eroded parts were once cultivated. Most of these eroded areas are now either in very poor pasture or lying idle; they are still deteriorating and will continue to do so while they do not have the protection of a complete and undisturbed vegetative cover. For protection of the land below them, they should be reforested.

CAPABILITY UNIT VIIs-1

This unit includes all severely eroded, very rocky soils; all very steep, very rocky soils; and all extremely rocky soils of the county. Rockiness is the result of massive outcrops of limestone. The soils of this unit are—

Corydon extremely rocky clay loam, 0 to 15 percent slopes.
Duffield extremely rocky silt loam, 0 to 15 percent slopes.
Frankstown extremely rocky silt loam, 0 to 25 percent slopes.
Frankstown extremely rocky silt loam, 25 to 45 percent slopes.
Frankstown very rocky silt loam, 8 to 15 percent slopes, severely eroded.
Hagerstown extremely rocky silt loam, 0 to 25 percent slopes, moderately eroded.
Hagerstown extremely rocky silty clay loam, 0 to 25 percent slopes, moderately eroded.
Hagerstown extremely rocky soils, 25 to 45 percent slopes.
Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded.
Hagerstown very rocky soils, 45 to 55 percent slopes.
Rocky eroded land.

These soils are located wherever there are limestone outcrops, but most of them are in the great limestone valley. The total area is about 17,500 acres, or 6 percent of the county.

These soils have fairly high natural fertility. They are too rocky and many of them are much too severely eroded to be managed, even for pasture. Some areas might furnish very limited grazing but not enough to be of any practical importance.

Because of their inherent fertility, these soils could support good woodlots if they were planted with suitable kinds of trees and carefully protected from fire and grazing. Timber operations will be very difficult on some of the steep and extremely rocky areas, but forestry is still the best economic use of the soils. Good woodland cover will also provide an excellent habitat for many types of wildlife.

CAPABILITY UNIT VIIs-2

In this unit are all the shallow, very stony soils and all the steep, very stony soils of the county. All are underlain by acid rocks; none are influenced by limestone. The soils of this unit are—

Dekalb and Leetonia very stony sandy loams, 0 to 25 percent slopes.
Dekalb and Leetonia very stony sandy loams, 25 to 45 percent slopes.
Dekalb and Leetonia very stony sandy loams, 45 to 60 percent slopes.
Dekalb and Lehew very stony loams, 0 to 25 percent slopes.
Dekalb and Lehew very stony loams, 25 to 45 percent slopes.
Edgemont and Laidig very stony loams, 35 to 60 percent slopes.
Highfield very stony loam, 30 to 45 percent slopes.
Laidig very stony loam, 15 to 45 percent slopes, moderately eroded.
Myersville very stony loam, 30 to 55 percent slopes, eroded.
Stony rolling land.

Most of these soils are on South Mountain or on Elk Ridge. The total area is about 9,700 acres, or 3.3 percent of the county.

Although these soils are very stony and some of them are steep, they are all suitable for some kind of forest. They are not good forest soils, but they should produce some timber. The soils would furnish no substantial

economic return in any other agricultural use. There is no good reason for clearing any of the areas for farming. Removal of timber products should be selective while the land remains in forest. Most of these soils are in State or National forests and parks. This is an excellent use for them.

CAPABILITY UNIT VIIIs-1

This capability unit consists of only one soil mapping unit, which is Stony steep land. It is too rough, stony, and steep for any agricultural use. There are 2,713 acres in the county, or nine-tenths of 1 percent of the total area.

Parts of these areas have a cover or partial cover of trees and shrubs. They must be considered in class VIII, however, because the production of timber or other forest products is not and never will be a feasible economic operation. Most of these areas furnish good cover for wildlife and are so located that they furnish sites for hiking, camping, picnicking, and other forms of recreation. Thus, although this land has no use in agriculture, it is of considerable importance to the citizens of the county.

Use of Soils for Woodland

Washington County is in that part of eastern United States where the forests are dominated by hardwood trees. While some conifers, probably redcedar, white pine, Virginia pine, and hemlock, undoubtedly grew there when the county was first settled by Europeans, there is no historical reason to believe that any of them existed in even fairly pure stands.

Practically no truly virgin forests remain in the county. However, a few small tracts have been observed that show no evidence of having been altered by the activities of man or domestic animals. At the time this soil survey was made, there remained a total of about 84,000 acres of woodland in the county; this is about 28 percent of the county. According to the U.S. Census of Agriculture, there were 31,029 acres of woodland in farms in 1954. It can be assumed that the other forests (about 53,000 acres) are on public lands or on other areas not classified as farm holdings. Farm woodlands decreased by some 3,000 acres between 1949 and 1954.

The value of commercial timber cut from private lands in 1949 was $18,500, and the yearly average from 1952 through 1956 was $88,500 according to the Maryland Department of Forests and Parks. The increase in yearly value is because of a small increase in volume and a much larger increase in unit values. In 1954, about one-fourth of the income derived from the sale of timber products came from farms, and the rest, from nonfarm areas. Considerable volumes of small forest products are cut and sold or used on the farm by landowners who do not report them. Increased interest in woodland management and higher timber prices indicate that the annual values of timber and other woodland products should increase.

In the main, the remaining forests of Washington County are in the mountainous areas and in the ridge and valley section west of Fairview Mountain. There are no significant remaining forests either in the great valley or in Pleasant Valley on the better soils of those areas. Trees are growing on some once-cultivated lands that became so severely eroded or otherwise deteriorated that they were abandoned and allowed to revegetate naturally.

There are four general kinds of forests in the county. One kind is old-growth hardwood forest. Another is forest on well-drained uplands that has been cut over one or more times. A third kind is forest that grows in poorly drained areas; and the fourth is forest that grows where abandoned fields and pastures are reforesting naturally.

Old-growth hardwood forests.—These forests are almost all on large farms and estates. Their total acreage is small. The dominant trees are white oak, red oak, and chestnut oak. There are some yellow-poplar, locust, and hickory trees, and a few black walnut trees.

These forests have not been exploited because, to their owners, their esthetic or sentimental value is greater than the value of the timber. Many of the trees are mature or overmature. Under proper forest management, the old trees should be marketed to make space for the growth of younger trees.

Cutover forests on well-drained sites.—Most of the forests in the county are of this kind. Oaks are dominant, and the secondary trees are elm, hickory, locust, maple, and dogwood. On some of the thinner and more droughty soils, there is some shortleaf pine and, in a few places, some Virginia pine. Most of the farm woodlots, which vary greatly in composition and condition, are included in this kind of forest.

Most of these cutover forests get little protection from fire or grazing. Besides their value for producing timber, these forests are valuable for watershed protection and for wildlife shelter.

Forests on poorly drained sites.—These forests grow on poorly drained soils of the uplands and on some of the terraces and flood plains along streams. Almost all of them have been cut over. The species of trees are different from those in the cutover forests of drier sites. Pin oak and scarlet oak are the common species, but the stands include hickory, swamp maple, and other maples, some elm, birch, and willow. Some areas have an undergrowth, and others have nearly pure stands of species, such as alder, that have no economic value.

These forests are of little economic importance. They furnish some fenceposts, and most of them are good wildlife shelter. Many have been thinned so that pastures could be developed and only enough trees have been left to provide shade for livestock.

Forests in abandoned fields.—Most of these forests are in fields that were no longer cultivated because they became too eroded to support crops or good pastures. Under natural revegetation, the first plants to become established are sassafras, persimmon, and hawthorn, blackberry, and other shrubs. In time, these are followed by oak, hickory, dogwood, locust, and other trees. In some places stands of Virginia pine and shortleaf pine have become established.

These forests should receive regular forest management. Areas that are still in the brushy stage should be planted with valuable species of trees.

Relationships of soils and forests

Soils vary in their ability to produce trees, just as they do in their ability to produce crops. Trees grow better on the soils that contain some lime than they do on the soils that are entirely acid. Soils that are no longer productive for crops or pasture are likely to be less productive of trees than they were before they were cleared. Differences in elevation and climate also affect the growth of trees.

In Washington County differences in slope, elevation, and climate have significant effects on the growth of trees, but differences in soils probably have stronger effects. Sandy and somewhat droughty soils are more suitable for germination of the seed of Virginia pine than for the seed of hardwood trees. As a seedbed, severely eroded soils that have much of the subsoil exposed are inferior to uneroded soils that have friable, granular surface soil. On deep, permeable soils the windthrow hazard is less serious than on shallow soils.

Soils affect the ease of harvesting timber and the hazards involved in logging. Some areas are too steep and too rough even for temporary roads for logging vehicles. In these areas logs generally can be skidded out by cables. Few forests in the county are extensive enough to justify building permanent access or logging roads. Temporary roads should be built as nearly as possible on the contour, because most of the sloping upland soils erode readily. To prevent gullying, the roads should not be allowed to become rutted.

Trees have significant effects on the soils of forested areas, especially on the surface layer. Under a good stand of hardwood trees in an ungrazed upland area, there is generally a cover of leaf litter 2 inches or more thick. The litter slows runoff, tends to keep the surface layer friable, and allows rainwater and snowmelt to soak in. As the litter decays or is consumed by earthworms or other animals, plant nutrients are added to the soil. The litter under pine trees is more acid, contains fewer plant nutrients, and has less beneficial effect on the surface soil than the litter of hardwoods.

Reforestation

Soils that are well suited to crops and pasture generally are also well suited to forests. However, only soils no longer productive for crops or pasture are likely to have greater value for forestry.

The soils that are steep or severely eroded should be given priority in any reforestation program. They will probably give greater returns from forest products than from any other use, and, in addition, the trees protect the soils. Because severely eroded soils generally are not the best forest sites, help should be sought from the district forester assigned to the county whenever reforestation is considered.

Soil groups for forestry

This section contains a grouping of the soils of Washington County according to their suitability for woodland. Mixed oaks were used as the index trees in making the grouping because they are the most common forest trees of the county. Most of the soils in the county are classified as excellent sites for mixed oaks. Some soils are rated as good, and others are rated as medium or poor. Group F1, the excellent sites for mixed oak trees, consists of deep soils that have no real impediment to the penetration of roots. The good sites include some soils that are fairly shallow over bedrock or that have a claypan or siltpan that hinders the deep penetration of roots. Medium sites include the shallow soils. Poor sites are the soils not suitable for growing oak trees because they are excessively steep, rough, very shallow, or eroded.

Soils have been listed in woodland suitability groups by giving names of the soil types. Some further statements about slope and degree of erosion are given to indicate placement of the mapping units that are sloping or eroded phases of soil types, and still further information is given about the influence of a southern exposure on ratings of the sloping soils. In general, a slope greater than 25 percent, or a southern exposure, reduces the site value of a good soil by one or two groups. All very severely eroded soils, and severely eroded, shallow soils, are in the lowest site group.

Woodland suitability groups of soils in the county and the soils in each group are given in the following list. Except as noted for six poorly drained soils in group F1, the soils have been rated for production of the mixed oak trees that were common in the native forests.

Soil group F1.—Excellent soils for woodland. They can produce high yields of good quality forest crops and are suitable for intensive forest management if well stocked. Poorly drained soils in this group are not suitable sites for mixed oak trees, and their rating is based on the production of pin oak.

Ashton fine sandy loam.
Atkins silt loam (poorly drained).
Benevola clay loam.
Braddock and Thurmont gravelly loams.
Brinkerton silt loam (poorly drained).
Chewacla gravelly sandy loam.
Chewacla silt loam.
Chewacla stony silt loam.
Congaree silt loam and gravelly loam.
Duffield silt loam.
Duffield extremely rocky silt loam.
Duffield very rocky silt loam.
Dunmore cherty silt loam.
Dunning and Melvin silty clay loams (poorly drained).
Edgemont and Laidig channery loams.
Edgemont and Laidig very stony loams.
Elliber cherty loam.
Etowah gravelly loam.
Etowah silt loam.
Fauquier channery loam.
Fauquier silt loam.
Fauquier very stony loam.
Frankstown extremely rocky silt loam.
Frankstown very rocky silt loam.
Frankstown and Duffield channery silt loams.
Frederick cherty silt loam.
Hagerstown clay loam.
Hagerstown extremely rocky silt loam.
Hagerstown extremely rocky silty clay loam.
Hagerstown silt loam.
Hagerstown silty clay loam.
Hagerstown very rocky silt loam.
Hagerstown very rocky silty clay loam.
Hagerstown, Corydon, and Duffield very rocky silt loams.
Hagerstown and Duffield silt loams.
Highfield gravelly loam.
Highfield very stony loam.
Holston gravelly loam.

Holston gravelly sandy loam.
Holston silt loam.
Huntington fine sandy loam.
Huntington gravelly loam.
Huntington silt loam.
Huntington silt loam, local alluvium.
Laidig gravelly loam.
Laidig very stony loam.
Largent silt loam.
Lindside silt loam.
Lindside silt loam, local alluvium.
Melvin silt loam (poorly drained).
Murrill gravelly loam.
Murrill gravelly sandy loam.
Murrill silt loam.
Myersville channery loam.
Myersville channery silt loam.
Myersville silt loam.
Myersville very stony loam.
Philo gravelly sandy loam.
Philo silt loam.
Pope fine sandy loam.
Pope gravelly loam.
Pope gravelly sandy loam.
Pope silt loam.
Pope stony gravelly loam.
Rohrersville silty clay loam (poorly drained).
Talladega gravelly silt loam, thick solum variant
Terrace escarpments.
Thurmont gravelly loam.
Warners loam.
Waynesboro gravelly loam.
Waynesboro gravelly sandy loam.
Wehadkee silt loam (poorly drained).
Westmoreland channery silt loam.

Soil group F2.—Good soils for woodland. The rate of growth is not so rapid as on the excellent soils, but it will justify fairly intensive management. Wood products of high quality can be grown.

Berks channery loam, ridges.
Berks shaly silt loam.
Berks silt loam, ridges.
Buchanan gravelly loam.
Calvin channery fine sandy loam.
Calvin channery loam.
Calvin shaly loam.
Calvin-Berks channery loams.
Chandler silt loam and channery silt loam.
Corydon clay loam.
Corydon extremely rocky clay loam.
Corydon very rocky clay loam.
Fauquier silt loam, shallow.
Hagerstown extremely rocky soils.
Hagerstown very rocky soils.
Landisburg cherty silt loam.
Leadvale gravelly silt loam.
Monongahela gravelly loam.
Monongahela silt loam.
Trego gravelly silt loam.
Tyler silt loam.
Southern slopes of 25 percent or more of soil types listed in group F1.

Soil group F3.—Medium soils for woodland. These soils will grow fairly good timber, but growth is slow.

Berks soils, ridges.
Calvin-Montevallo shaly loams.
Dekalb and Lehew very stony loams.
Hazel channery silt loam.
Litz channery loam.
Litz shaly loam.
Litz-Teas channery silt loams.
Montevallo shaly loam.
Slope phases of 40 percent or more of soil types listed in group F2.

Soil group F4.—Soils and land types that are poor for woodland. The growth rate, especially of hardwood trees, is very slow.

Dekalb and Leetonia very stony sandy loams.
Eroded land, greenstone materials.
Eroded land, limestone materials.
Eroded land, sandstone and quartzite materials.
Eroded land, shale and schist materials.
Rocky eroded land.
Stony rolling land.
Stony steep land.
Southern exposures of slope phases of 40 percent or more, of soil types listed in group F2.
All severely eroded phases of soil types listed in group F3.
All southern exposures of soil types listed in group F3.

Unfortunately, the soils that need reforestation the most urgently are those that make the poorest woodland sites. These soils are also the most difficult ones on which to obtain a stand of trees. This is particularly true because the seedlings of most hardwood trees, including oaks, are difficult to transplant and the rate of survival is low. Growth is irregular and very slow on the soils of groups F3 and F4.

Red oak and black walnut can be planted by direct seeding. Black walnut, in particular, needs a good soil and is most likely to be successful on the deeper soils of group F1. Because of the difficulty of establishing hardwoods, in general, most of the planting that is done should be of pine trees. According to information supplied by the Maryland Department of Forests and Parks, the best returns in Washington County, based on cords of wood produced, will be obtained from plantings of white, shortleaf, loblolly, and Corsican pines.

Although the county is outside the natural range of loblolly pine, this species may prove the most profitable for planting, particularly on sites where there is plenty of moisture. On very droughty and eroded sites, Virginia pine is probably the most suitable species for planting. Although it is of less economic importance than the other pines mentioned, it will survive on poorer sites. It will at least furnish good vegetative protection for the land and will provide a better habitat for wildlife than the idle, unoccupied land.

It is not the purpose of this report to give a detailed account of forest management, either as it is being, or should be, carried out. The purpose is chiefly to point out the soils on which forestry, including reforestation, might be an economic enterprise. The local district forester should be consulted on planting, management, and other details of forestry operations either on a farm or on a more extensive woodland.

Economic return is not the only benefit to be derived from forests. Forests should be left, or should be planted, to protect the headwaters of streams; to reduce runoff and thus help to control floods and conserve the lands not in forests; to furnish protective cover and food for wildlife; to maintain public and private recreational areas; and for other reasons that cannot be measured directly in dollars and cents. Not the least of these is the esthetic reason, merely to maintain and enhance the beauty of the landscape of Washington County.

Engineering Uses of Soils [2]

This part of the soil survey report for Washington County is intended to be a guide to physical soil properties and to the influences of such properties on problems related to engineering. It is generally recognized that the soil is a primary resource in agricultural production, but it is not so widely realized that soils are of great importance in many kinds of engineering practices and projects. We cannot build a road, excavate a basement, lay a waterline or other pipeline, install a septic tank, build a terrace or diversion ditch, or create an artificial pond without confronting problems created by the nature of the soil. How can we best use the soil material that is encountered, and how will the nature of the soil affect the job at hand?

The facts on which this section is based were obtained by close examination of soils in the field, and by evaluation of the physical characteristics exhibited in relation to some engineering needs. The evaluations were verified by some laboratory analyses. Extensive testing was not done in Washington County, but many interpretations were based on physical analyses of the same kinds of soil elsewhere, particularly in neighboring Frederick County (*7*). In this way, careful estimates were made of some physical properties of the soils of Washington County.

It is not intended that these data be used directly for engineering design. These facts and estimates are at best a guide; engineering design should be based on field surveys and the analysis of samples from construction sites. For example, this report will show that the subsoil of Tyler silt loam is not suitable for fill material to support heavy loads. This report will also show that the subsoil of Etowah gravelly loam is suitable for earthern dams for small ponds. However, it will not show just how good any particular spot of the Etowah subsoil will be for building a dam; tests will be necessary to determine this. The soil map, moreover, does not show the small inclusions of different soils that are present in some of the mapping units. For example, within an area of Holston soil, which is a source of good fill material, there can be in a wet spot or in an old channel a very small area of the Tyler soil. It is too small to map but should be avoided in searching for fill material.

Engineering descriptions and physical properties

The significant physical properties of Washington County soils are given in table 6. The table lists the names of soils and the symbol for each soil on the accompanying detailed soil map, except the complexes, miscellaneous land types, and some stony or steep soils. Table 6 also describes the soils and gives the engineering classification of each significant horizon of each soil. Items not important in engineering, such as color, are not included. The descriptions do include such items as the general profile characteristics, the kind of parent material or other substratum, drainage characteristics, depth to water table and to bedrock where these are known and significant, and presence of gravel or stones.

Table 6 also lists the estimated physical properties of the soils, by major horizons. Major horizons of all the soils of a series are much alike unless there has been a great deal of erosion. Unless otherwise specified, the physical characteristics and the soil descriptions apply to comparatively uneroded and nonstony soils, but there are notes on the degree of erosion, stoniness, content of gravel, and other items. Thickness of the soil horizons varies somewhat from place to place. Thicknesses given in the table, as well as the other properties, are those actually existing in a specific profile that is a model representative of the soil being described and characterized. On severely eroded soils, there will be little, if any, of the original surface soil remaining; in such severely eroded soils, the underlying horizons will be closer to the eroded surface than indicated in the table.

Soil textural classes of the United States Department of Agriculture are defined in the Soil Survey Manual (*9*).

The Unified classification (*10*) was developed at Vicksburg Waterways Experiment Station by the Corps of Engineers, U.S. Army. In this system soil material is put in 15 classes that are designated by pairs of letters. These classes range from GW, which consists of well-graded gravel, gravel and sand mixtures, and a little fine material, to Pt, which consists of peat and other highly organic soils.

Many highway engineers classify soil material according to the AASHO method (*1*). This method was adopted by the American Association of State Highway Officials. In this system soil materials are classed in seven principal groups. The groups range from A–1, consisting of soils that have high bearing capacity, to A–7, consisting of clayey soils having low strength when wet.

Soil interpretations for engineering

Table 7 lists some important features of each soil of Washington County as they affect different kinds of engineering work. These interpretations are made from table 6, from various test data, and from field experiences of engineers and others. Any soil may be well suited to one engineering purpose but poor or even unsuitable for some other purpose. For instance, soils of the Dunmore series should be fair for disposal of effluent from septic tanks, poor or only fair for road subgrade, and good as a source of topsoil. Soils of the Litz series should be poor for the disposal of sewage effluent, good for road fill and subgrade, and only fair as topsoil.

Individual soil features will also have various interpretations. A fragipan layer within the subsoil generally indicates suitable sites for ponds or reservoir areas, but poor materials for embankments or dams; it greatly increases the difficulty of providing adequate drainage, and limits the adaptability of the soil for irrigation. The purpose of table 7 is to suggest indicators of either good or hazardous features that may be of help in planning, engineering design, or construction.

[2] By EARLE D. MATTHEWS and KENDALL P. JARVIS. Mr. Jarvis is State conservation engineer for Maryland and Delaware, Soil Conservation Service.

The interpretations in table 7 are general but will point out what the engineer can expect to encounter in any soil area that is shown on the detailed soil map. However, they cannot give exact soil properties and evaluations of the soil at the exact points where engineering projects may be planned, and, as stated elsewhere, many of the mapping units contain spots of different or even of contrasting soils that are too small to be shown at the scale of mapping.

Soil groups for irrigation

The annual rainfall in Washington County is normally adequate in amount for the crops grown, but there are periods when it is not well distributed during the growing season. Because there are frequent, rather extended periods of soil moisture deficiency between June and September, many crops, including hay crops and pasture, will suffer. If adequate irrigation systems and water supplies were readily available during such periods, reductions in crop yields, as in the summer of 1957, could be prevented.

This section of the report arranges the better agricultural soils into groups, according to common characteristics, which would show significant results from conservation irrigation. Conservation irrigation simply means applying the needed amounts of irrigation water, with minimum waste of water and damage to soil, to maintain productivity at a high level. All irrigation herein considered is sprinkler irrigation.

The following information is not intended to be a guide for sprinkler irrigation design. Such a guide has been developed by engineers of the Soil Conservation Service for use in Maryland. In this discussion the soils will be arranged in significant groups of fairly uniform characteristics, and for each group certain questions about irrigation will be answered. How deep should the soil of different groups be irrigated for different types of crops? How much water should be applied on each group for each crop, and how fast can it be applied without waste or damage? The answers to these questions will help in establishing the feasibility of irrigation for the various soil groups and will give some basic information useful in designing irrigation systems for conservation irrigation.

Wherever conservation irrigation is practiced, it should be part of a complete farm program of soil and water conservation. Because irrigation is expensive, it can be used economically only on productive soils on which production can be assured or increased. Proper management of such soils will include liberal fertilization, adequate liming, and good rotations or other cropping systems that will control erosion, minimize leaching, maintain good soil tilth, and furnish a supply of organic matter. For these reasons, only soils considered suitable for regular cultivation are included in the irrigation soil groups. These soils are suitable for more or less continuous cultivation with the kinds and intensities of management appropriate in each case.

Land to be irrigated advantageously must have good drainage. However, in addition to the soils of the county that are well drained, some only moderately well drained soils are included in the irrigation soil groups. Such soils will need adequate artificial drainage before they are suitable for irrigation. Soils that are somewhat poorly drained or poorly drained are omitted in the irrigation soil group, as are all severely eroded soils.

A common mistake of new irrigators is to overextend the use of the available water supply. An adequate water supply must be available if irrigation is to be successful. The water supply should be adequate to maintain the soil at a moisture level, or a series of moisture levels, that will yield the greatest return for the funds invested in irigation. The ordinary farm pond will not supply sufficient water for irrigation, except perhaps for very small home gardens.

Water may be obtained from wells, streams, or reservoirs. A permit to drill an irrigation well or construct a pond or reservoir must be obtained from the State Department of Geology, Mines and Water Resources, located at Johns Hopkins University, Baltimore. That department can also supply information on ground water possibilities for most areas of the State. It is good practice to have a test well drilled to determine if an adequate water supply is available.

Only streams with sustained or continuous flow during extended periods of drought can be used as sources of water for irrigation. The streamflow should be measured during periods of drought to determine if sufficient water is available at such times. A surface reservoir must have a storage capacity large enough to meet crop needs during the irrigation season, including losses caused by evaporation and seepage. As a general rule, from one-half to 1 acre-foot of storage is recommended during the irrigation season for each acre to be irrigated. If the reservoir can be refilled between irrigations, then the capacity need only be large enough to provide one application.

Quality of water must also be examined. If there is any question about suitability of water, samples should be sent to the State Soil Testing Laboratory, Agronomy Department, University of Maryland, College Park. This laboratory will analyze water for acidity, salt content, or other constituents that might be harmful to crops. If surface runoff water is used for irrigation, it should not be collected from areas contaminated by plant disease organisms that could be harmful to the crops to be irrigated.

Laws and regulations govern the use of water from streams and wells. A landowner does not own all of the water in the stream that flows through his land. Landowners who plan to appropriate water for irrigation from channelized streams should obtain information regarding their rights from qualified sources, before investing in equipment.

Some locally adapted crops are indicated under each irrigation soil group. Irrigation soil groups are defined in table 8, and the soils included in each group are listed. Tomatoes and Irish potatoes are listed separately, but all other truck crops are shown simply as of truck-crop groups 1, 2, or 3.

TABLE 6.—*Brief description of soils*

Map symbol	Soil name	Depth to seasonally high water table	Depth to bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet	*Feet*		*Inches*
AsB	Ashton fine sandy loam, 0 to 5 percent slopes	4	(1)	Well-drained, deep soils on low terraces; developed in old alluvium derived from limestone. Subject to very infrequent flooding.	0–16 16–80 80–108
At	Atkins silt loam	0–1	(1)	Poorly drained soils on flood plains; of recent alluvium derived from acid shale and sandstone. Very wet; fairly frequently flooded.	0–6 6–16 16–36+
BaA	Benevola clay loam, 0 to 3 percent slopes	(2)	3–6	Well-drained upland soils developed in residuum from highly sandy limestone. Variable depth to bedrock, with occasional outcrops. Severely eroded areas have a CH (A–7) surface layer.	0–6 6–35 35–42 42+
BaB2	Benevola clay loam, 3 to 8 percent slopes, moderately eroded.	(2)	3–6		
BaC2	Benevola clay loam, 8 to 15 percent slopes, moderately eroded.	(2)	3–6		
BaC3	Benevola clay loam, 8 to 15 percent slopes, severely eroded.	(2)	0–4		
BcB2	Berks channery loam, ridges, 0 to 10 percent slopes, moderately eroded.	(2)	2–3	Well-drained to somewhat excessively drained, shallow upland soils developed in residuum from acid shale, in many places with sandstone. Channery loams have sandstone fragments in the surface layer; shaly silt loams have shale; silt loams have little shale in the surface layer. All Berks soils have abundant shale in the subsoil and the substratum. Severely eroded soils have lost 6 to 12 inches of the original soil, and in some places there are many gullies, some to bedrock.	0–8 8–13 13–29 29+
BcC2	Berks channery loam, ridges, 10 to 20 percent slopes, moderately eroded.	(2)	2–3		
BcC3	Berks channery loam, ridges, 10 to 20 percent slopes, severely eroded.	(2)	0–2		
BcD2	Berks channery loam, ridges, 20 to 30 percent slopes, moderately eroded.	(2)	2–3		
BeB	Berks shaly silt loam, 0 to 8 percent slopes	(2)	2–3		
BeB2	Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded.	(2)	2–3		
BeC2	Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded.	(2)	2–3		
BeD2	Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded.	(2)	2–3		
BkB2	Berks silt loam, ridges, 0 to 10 percent slopes, moderately eroded.	(2)	2–3		
BkC2	Berks silt loam, ridges, 10 to 20 percent slopes, moderately eroded.	(2)	2–3		
BkC3	Berks silt loam, ridges, 10 to 20 percent slopes, severely eroded.	(2)	0–2		
BkD2	Berks silt loam, ridges, 20 to 30 percent slopes, moderately eroded.	(2)	2–3		
BoE3	Berks soils, ridges, 20 to 45 percent slopes, severely eroded.	(2)	0–2		
BoF	Berks soils, ridges, 30 to 60 percent slopes	(2)	0–3		
BtB	Brinkerton silt loam, 0 to 8 percent slopes	1	(1)	Poorly drained soils of draws and depressions, developed in old local colluvium and alluvium from acid shale areas. Very wet.	0–7 7–15 15–42+
BuA	Buchanan gravelly loam, 0 to 3 percent slopes.	3 2	(1)	Moderately well drained soils on gravelly colluvial deposits of acid sandstone and some acid shale material. Moderately wet.	0–7 7–34 34–60+
BuB2	Buchanan gravelly loam, 3 to 8 percent slopes, moderately eroded.	3 2	(1)		
BuC2	Buchanan gravelly loam, 8 to 15 percent slopes, moderately eroded.	3 2	(1)		
BuD2	Buchanan gravelly loam, 15 to 25 percent slopes, moderately eroded.	3 2	(1)		
CaB2	Calvin channery fine sandy loam, 3 to 10 percent slopes, moderately eroded.	(2)	2–4	Somewhat excessively drained, rather shallow, upland soils developed in residuum from reddish, acid shale and sandstone. Physical properties given are for Calvin channery loam. The channery fine sandy loam has an SM to GM surface layer. The shaly loam lacks sandstone fragments. Severely eroded soils have lost 6 to 12 inches of the original soil, and in places have many gullies, some to bedrock.	0–31 31–42+
CcB2	Calvin channery loam, 3 to 10 percent slopes, moderately eroded.	(2)	2–3		
CcC2	Calvin channery loam, 10 to 20 percent slopes, moderately eroded.	(2)	2–3		
CcD	Calvin channery loam, 20 to 30 percent slopes.	(2)	2–3		
CcD2	Calvin channery loam, 20 to 30 percent slopes, moderately eroded.	(2)	2–3		
CcE	Calvin channery loam, 30 to 45 percent slopes.	(2)	2–3		
CcF	Calvin channery loam, 45 to 60 percent slopes.	(2)	2–3		

See footnotes at end of table.

and their estimated physical properties

USDA textural class	Engineering classification		Percentage passing sieve—			Selected characteristics significant in engineering			
	Unified	AASHO	No. 4	No. 10	No. 200	Range in permeability	Reaction	Dispersion	Shrink-swell potential
			Percent	*Percent*	*Percent*	*Inches per hour*	*pH*		
Fine sandy loam	SM	A–2 or A–4	100	100	40	0. 6–2. 0	6. 1–7. 3	High	Low.
Loam, fine sandy loam, or silt loam.	ML	A–4	100	95	55	0. 2–2. 0	6. 1–7. 8	High	Low.
Gravelly loam	GM	A–2	50	30	20	0. 6–2. 0	7. 4–8. 4		Very low.
Silt loam	ML	A–4	100	100	75	0. 6–2. 0	5. 6–6. 5	Moderate	Low.
Silty clay loam	CL	A–6	100	100	80	0. 06–0. 2	5. 1–5. 5	Moderate	Moderate.
Gravelly sandy clay loam	GC	A–2	50	40	25	0. 06–0. 2	4. 5–5. 0	High	Moderate.
Clay loam	CL	A–6	100	100	85	0. 2–0. 6	6. 6–7. 3	Low	Moderate.
Clay or clay loam	CH	A–7	100	100	90	0. 2–0. 6	6. 6–7. 8	Low	Moderate.
Gravelly fine sand	SP	A–3	85	80	5	2. 0–6. 3	7. 4–9. 0	High	None.
Hard, sandy limestone									
Channery loam	SM or ML	A–2 or A–4	90	80	45	0. 6–2. 0	5. 1–5. 5	Moderate	Low.
Shaly silt loam	SM or ML	A–4	75	60	45	0. 6–2. 0	4. 5–5. 0	High	Low.
Fragmented shale	GM	A–2	20	10	5		4. 5–5. 0		None.
Hard shale									
Silt loam	ML	A–4	100	100	75	0. 2–0. 6	5. 6–6. 0	Moderate	Low.
Shaly silty clay loam	CL	A–6	85	75	70	0. 02–0. 06	6. 1–6. 5	Low	Moderate.
Clay	CH	A–7	100	100	95	0. 0–0. 02	5. 6–7. 3	Low to high	Very high.
Gravelly loam	SM or GM	A–2 or A–4	70	60	40	0. 6–2. 0	4. 5–5. 5	Moderate to high.	Low.
Silty clay loam to clay loam.	CL	A–6	90	85	65	0. 06–0. 6	4. 5–5. 0	Low	Moderate.
Gravelly loam	GM	A–2	60	50	30	0. 06–0. 2	4. 5–5. 0	High	Low.
Channery loam	GM	A–2	60	50	25	0. 6–2. 0	4. 5–5. 5	Moderate to high.	Low.
Fragmented shale	GM	A–2	35	25	10	2. 0–6. 3	4. 5–5. 0	High	Very low.

TABLE 6.—*Brief description of soils and their*

Map symbol	Soil name	Depth to seasonally high water table	Depth to bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet	*Feet*		*Inches*
CmB2	Calvin shaly loam, 0 to 10 percent slopes, moderately eroded.	(2)	2–3		
CmC2	Calvin shaly loam, 10 to 20 percent slopes, moderately eroded.	(2)	2–3		
CmC3	Calvin shaly loam, 10 to 20 percent slopes, severely eroded.	(2)	1–2		
CmD	Calvin shaly loam, 20 to 30 percent slopes.	(2)	2–3		
CmE	Calvin shaly loam, 30 to 45 percent slopes.	(2)	2–3		
CrB	Chandler silt loam and channery silt loam, 0 to 10 percent slopes.	(2)	3–4	Well-drained to somewhat excessively drained, shallow, upland soils developed in residuum from mica schist. Physical properties given are for Chandler channery silt loam. Chandler silt loam has a few schist fragments in the surface horizon.	0–9
CrB2	Chandler silt loam and channery silt loam, 3 to 10 percent slopes, moderately eroded.	(2)	3–4		9–48+
CrC2	Chandler silt loam and channery silt loam, 10 to 20 percent slopes, moderately eroded.	(2)	3–4		
CrD	Chandler silt loam and channery silt loam, 20 to 30 percent slopes.	(2)	3–4		
Cs	Chewacla gravelly sandy loam	1–2	(1)	Moderately well drained soils of flood plains, of recent alluvium from crystalline rocks. Physical properties given are for Chewacla silt loam. The gravelly sandy loam is SM throughout. The stony silt loam is about 20 to 40 percent stone. Moderately wet to seasonally very wet.	0–33
Ct	Chewacla silt loam	1–2	(1)		33–43+
Cu	Chewacla stony silt loam	1–2	(1)		
Cv	Congaree silt loam and gravelly loam	4	(1)	Well-drained, deep soils of flood plains, of recent alluvium from crystalline rocks. Areas are either silt loam or gravelly loam. Physical properties given are for silt loam. Gravelly areas contain 20 to 30 percent gravel in the ML horizon.	0–39 39+
CwA	Corydon clay loam, 0 to 3 percent slopes	(2)	1–3	Well-drained, shallow to moderately deep, upland soils developed in residuum from limestone. Physical properties given are for Corydon clay loam, which has some rock outcrops. Rock outcrops cover 25 to 40 percent of the surface of the very rocky clay loam, and 40 to 90 percent of the extremely rocky clay loam.	0–14
CwB2	Corydon clay loam, 3 to 8 percent slopes, moderately eroded.	(2)	1–3		14+
CwC2	Corydon clay loam, 8 to 15 percent slopes, moderately eroded.	(2)	1–3		
CxC	Corydon extremely rocky clay loam, 0 to 15 percent slopes.	(2)	0–3		
CyE2	Corydon very rocky clay loam, 3 to 45 percent slopes, moderately eroded.		0–3		
DeD	Dekalb and Leetonia very stony sandy loams, 0 to 25 percent slopes.	(2)	2–4	Excessively drained, upland soils developed in residuum from quartzitic sandstone (Dekalb), or from coarse-grained sandstone (Leetonia), or from acid red sandstone (Lehew). Physical properties given are for Dekalb. Lehew and Leetonia generally have less coarse skeleton, and in places are SM instead of GM to bedrock.	0–43
DeE	Dekalb and Leetonia very stony sandy loams, 25 to 45 percent slopes.	(2)	2–4		43+
DeF	Dekalb and Leetonia very stony sandy loams, 45 to 60 percent slopes.	(2)	2–4		
DkD	Dekalb and Lehew very stony loams, 0 to 25 percent slopes.	(2)	2–4		
DkE	Dekalb and Lehew very stony loams, 25 to 45 percent slopes.	(2)	2–4		
DuC	Duffield extremely rocky silt loam, 0 to 15 percent slopes.	(2)	0–6	Well-drained, deep, upland soils developed in residuum from interbedded shale and limestone. Physical properties given are for Duffield silt loam. Rock outcrops cover 25 to 40 percent of the very rocky silt loam, and 40 to 90 per cent of the extremely rocky silt loam. Severely eroded soils have lost the original ML surface layer and are CL throughout.	0–8
DmA	Duffield silt loam, 0 to 3 percent slopes	(2)	4–7		8–60+
DmB2	Duffield silt loam, 3 to 8 percent slopes, moderately eroded.	(2)	4–7		
DmC2	Duffield silt loam, 8 to 15 percent slopes, moderately eroded.	(2)	4–7		
DmD3	Duffield silt loam, 8 to 25 percent slopes, severely eroded.	(2)	2–6		
DmD2	Duffield silt loam 15 to 25 percent slopes, moderately eroded.	(2)	4–7		
DvC	Duffield very rocky silt loam, 3 to 15 percent slopes.	(2)	0–6		
DvE2	Duffield very rocky silt loam, 8 to 45 percent slopes, moderately eroded.	(2)	0–6		

See footnotes at end of table.

estimated physical properties—Continued

USDA textural class	Engineering classification		Percentage passing sieve—			Selected characteristics significant in engineering			
	Unified	AASHO	No. 4	No. 10	No. 200	Range in permeability	Reaction	Dispersion	Shrink-swell potential
			Percent	*Percent*	*Percent*	*Inches per hour*	*pH*		
Channery silt loam	ML or MH	A-4 or A-5	80	75	65	0. 2–2. 0	4. 5–6. 0	Moderate to high.	Low.
Very channery silt loam	GM	A-2	55	35	15	0. 6–2. 0	4. 0–5. 0		Low.
Silt loam	ML	A-4	100	100	75	0. 2–0. 6	4. 5–5. 5	Moderate	Low.
Gravelly sandy loam	SM	A-2	85	65	35	0. 06–0. 6	4. 0–4. 5	Moderate	Low.
Silt loam	ML	A-4	100	100	70	0. 6–2. 0	6. 1–6. 5	High	Low.
Gravelly loam	GM	A-2	60	45	30	2. 0–6. 3	5. 1–5. 5		Low.
Clay loam Hard limestone	CL	A-6	100	100	85	0. 06–0. 6	6. 1–6. 5	Moderate	Moderate.
Very stony sandy loam Hard quartzitic sandstone	GM	A-1 or A-2	30	20	15	2. 0–6. 3	4. 0–5. 0	High	None.
Silt loam	ML	A-4	100	95	70	0. 6–2. 0	6. 1–7. 3	Moderate	Low.
Silty clay loam	CL	A-6 or A-7	100	95	80	0. 06–0. 6	5. 6–7. 3	Low to moderate.	Moderate.

TABLE 6.—*Brief description of soils and their*

Map symbol	Soil name	Depth to seasonally high water table	Depth to bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet	*Feet*		*Inches*
DyB2	Dunmore cherty silt loam, 3 to 8 percent slopes, moderately eroded.	(2)	5–8	Well-drained, deep, upland soils developed in residuum from cherty limestone.	0–11
DyC2	Dunmore cherty silt loam, 8 to 15 percent slopes, moderately eroded.	(2)	5–8		11–21 21–54+
Dz	Dunning and Melvin silty clay loams	0–1	(1)	Either poorly drained (Melvin) or very poorly drained (Dunning) soils of flood plains, of recent alluvium from limestone areas. Physical properties given are for Dunning; very wet; fairly frequently flooded.	0–32 32–42+
EdC	Edgemont and Laidig channery loams, 0 to 12 percent slopes.	(2)	3–5	Either Edgemont channery loam or Laidig channery loam. Properties and depths given are for Edgemont: Well-drained upland soils developed in residuum from quartzitic sandstone. Very stony types in some places contain as much as 40 to 50 percent stones.	0–22 22–50 50+
EdD2	Edgemont and Laidig channery loams, 5 to 20 percent slopes, moderately eroded.	(2)	3–5		
EdE2	Edgemont and Laidig channery loams, 20 to 35 percent slopes, moderately eroded.	(2)	3–5		
EdF2	Edgemont and Laidig channery loams, 35 to 60 percent slopes, moderately eroded.	(2)	3–5		
EgA	Edgemont and Laidig very stony loams, 0 to 5 percent slopes.	(2)	3–5		
EgD	Edgemont and Laidig very stony loams, 5 to 35 percent slopes.	(2)	3–5		
EgF	Edgemont and Laidig very stony loams, 35 to 60 percent slopes.	(2)	3–5		
EhB2	Elliber cherty loam, 5 to 12 percent slopes, moderately eroded.	(2)	3–5	Well-drained upland soils developed in residuum from cherty limestone. There are occasional outcropping ledges of limestone.	0–8 8–39+
EhD2	Elliber cherty loam, 12 to 25 percent slopes, moderately eroded.	(2)	3–5		
EhE2	Elliber cherty loam, 25 to 45 percent slopes, moderately eroded.	(2)	3–5		
EhF	Elliber cherty loam, 45 to 55 percent slopes	(2)	3–5		
EtA	Etowah gravelly loam, 0 to 3 percent slopes	4+	(1)	Well-drained, deep soils on high terraces, of very old alluvium from limestone areas. Physical properties given are for gravelly loam; silt loam is nearly free of gravel in the uppermost 3 feet of the surface layer.	0–16 16–33 33–42+
EtB2	Etowah gravelly loam, 3 to 8 percent slopes, moderately eroded.				
EtC2	Etowah gravelly loam, 8 to 15 percent slopes, moderately eroded	4+	(1)		
EtD2	Etowah gravelly loam, 15 to 25 percent slopes, moderately eroded.	4+	(1)		
EwA	Etowah silt loam, 0 to 3 percent slopes	4+	(1)		
EwB2	Etowah silt loam, 3 to 8 percent slopes, moderately eroded.	4+	(1)		
EwC2	Etowah silt loam, 8 to 15 percent slopes, moderately eroded.	4+	(1)		
FaB	Fauquier channery loam, 0 to 5 percent slopes.	(2)	5+	Well-drained, deep, upland soils developed in residuum from metabasalt. Physical properties given are for channery loam; silt loam has the same essential properties but contains fewer stone fragments; the shallow phase is about 2 feet deep over bedrock; very stony loams contain 40 to 50 percent stones, and are variable in depth to bedrock.	0–20 20–50 50–72+
FaB2	Fauquier channery loam, 5 to 10 percent slopes, moderately eroded.	(2)	5+		
FaC2	Fauquier channery loam, 10 to 20 percent slopes, moderately eroded.	(2)	5+		
FaE2	Fauquier channery loam, 20 to 35 percent slopes, moderately eroded.	(2)	5+		
FsA	Fauquier silt loam, 0 to 3 percent slopes	(2)	5+		
FsB2	Fauquier silt loam, 3 to 10 percent slopes, moderately eroded.	(2)	5+		
FsC2	Fauquier silt loam, 10 to 20 percent slopes, moderately eroded.	(2)	5+		
FtC2	Fauquier silt loam, shallow, 3 to 20 percent slopes, moderately eroded.	(2)	2		
FrE	Fauquier very stony loam, 5 to 35 percent slopes.	(2)	1–6		

See footnotes at end of table.

estimated physical properties—Continued

USDA textural class	Engineering classification		Percentage passing sieve—			Selected characteristics significant in engineering			
	Unified	AASHO	No. 4	No. 10	No. 200	Range in permeability	Reaction	Dispersion	Shrink-swell potential
			Percent	*Percent*	*Percent*	*Inches per hour*	*pH*		
Cherty silt loam	ML	A-4	85	75	65	0. 6–2. 0	5. 1–6. 5	Low to moderate.	Low.
Cherty silty clay loam	CL	A-6	70	65	55	0. 2–0. 6	6. 1–6. 5	Moderate	Moderate.
Clay	CH	A-7	85	80	75	0. 06–0. 6	4. 6–5. 5	Low	Moderate.
Silty clay loam to fine sandy clay.	CL	A-6 or A-7	100	100	80	0. 06–0. 2	6. 6–7. 8	Moderate to high.	Moderate to high.
Gravelly coarse sandy loam.	SM	A-2	80	50	30	6. 3+	7. 4–7. 8		None
Channery loam	SM	A-2 or A-4	80	55	40	0. 6–6. 3	5. 1–6. 5	Moderate	Low.
Channery sandy clay loam.	SC	A-4 or A-6	85	65	50	0. 2–2. 0	5. 1–5. 5	Low to moderate.	Low.
Hard quartzitic sandstone									
Cherty loam	SM	A-4	90	75	40	0. 6–2. 0	5. 6–6. 5	High	Low.
Cherty silt loam	ML	A-4	85	75	55	0. 6–2. 0	5. 1–5. 5	High to moderate.	Low.
Gravelly loam	ML	A-4	85	75	50	0. 6–2. 0	5. 6–6. 5	Moderate	Low.
Gravelly silty clay loam	CL	A-6	90	80	60	0. 2–0. 6	6. 6–7. 3	Low	Moderate.
Very gravelly coarse sandy clay.	GC	A-4	65	55	45	0. 2–0. 6	6. 6–7. 8		Moderate.
Channery loam or silt loam.	ML or MH	A-4 or A-5	90	85	60	0. 2–2. 0	5. 6–7. 0	Moderate	Low to moderate.
Channery silty clay loam	CL	A-6 or A-7	90	85	75	0. 06–0. 6	5. 1–6. 5	Low	Moderate.
Silt loam	MH	A-5 or A-7	95	90	85	5. 1–6. 0	5. 1–6. 0	High	Moderate.

TABLE 6.—*Brief description of soils and their*

Map symbol	Soil name	Depth to seasonally high water table	Depth to bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet	*Feet*		*Inches*
FwA	Frankstown and Duffield channery silt loams, 0 to 3 percent slopes.	(2)	0–5+	Either Frankstown or Duffield channery silt loam. Physical properties given are for Frankstown channery silt loam. Duffield channery silt loam has physical properties like those given for Duffield silt loam, except that it contains more coarse skeleton. Severely eroded soils will be CL from surface to parent material.	0–8
FwB2	Frankstown and Duffield channery silt loams, 3 to 8 percent slopes, moderately eroded.	(2)	0–5+		8–29
FwB3	Frankstown and Duffield channery silt loams, 0 to 8 percent slopes, severely eroded.	(2)	2–4		29–44
FwC2	Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, moderately eroded.	(2)	0–5+		44+
FwC3	Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, severely eroded.	(2)	2–4		
FwD2	Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, moderately eroded.	(2)	0–5+		
FwD3	Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, severely eroded.	(2)	2–4		
FwE2	Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, moderately eroded.	(2)	0–5+		
FwE3	Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, severely eroded.	(2)	2–4		
FyB2	Frederick cherty silt loam, 0 to 8 percent slopes, moderately eroded.	(2)	4–6	Well-drained, deep, upland soils developed in residuum from cherty limestone. Severely eroded soils have lost the original ML horizon and are CL almost to the surface.	0–12
FyC2	Frederick cherty silt loam, 8 to 15 percent slopes, moderately eroded.	(2)	4–6		12–41
FyC3	Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded.	(2)	2–5		41–48+
FyD2	Frederick cherty silt loam, 15 to 25 percent slopes, moderately eroded.	(2)	4–6		
HaA	Hagerstown clay loam, 0 to 3 percent slopes	(2)	2–7	Well-drained upland soils developed in residuum from fairly pure, massive limestone. Very irregular depth to bedrock, with occasional to extremely abundant outcrops of hard limestone. Physical properties given are for the silt loam. The clay loams have a CL surface layer. Limestone outcrops cover 40 to 90 percent of the surface of the extremely rocky phases, and 25 to 40 percent of the very rocky phases. Severely eroded soils have lost most of the original surface layer, and have occasional to frequent gullies.	0–3
HaB2	Hagerstown clay loam, 0 to 8 percent slopes, moderately eroded.	(2)	2–7		8–29
HaB3	Hagerstown clay loam, 3 to 8 percent slopes, severely eroded.	(2)	1–6		29–49
HaC2	Hagerstown clay loam, 8 to 15 percent slopes, moderately eroded.	(2)	2–7		49–74
HaC3	Hagerstown clay loam, 8 to 15 percent slopes, severely eroded.	(2)	1–6		74+
HaD2	Hagerstown clay loam, 15 to 25 percent slopes, moderately eroded.	(2)	2–7		
HaD3	Hagerstown clay loam, 15 to 25 percent slopes, severely eroded.	(2)	1–6		
HbD2	Hagerstown extremely rocky silt loam, 0 to 25 percent slopes, moderately eroded.	(2)	0–7		
HcD2	Hagerstown extremely rocky silty clay loam, 0 to 25 percent slopes, moderately eroded.	(2)	0–7		
HdE	Hagerstown extremely rocky soils, 25 to 45 percent slopes.	(2)	0–5		
HeA	Hagerstown silt loam, 0 to 3 percent slopes		2–7		
HeB2	Hagerstown silt loam, 0 to 8 percent slopes, moderately eroded.	(2)	2–7		
HeC2	Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded.	(2)	2–7		
HeD2	Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded.	(2)	2–7		
HfA	Hagerstown silty clay loam, 0 to 3 percent slopes.	(2)	2–7		
HfB2	Hagerstown silty clay loam, 0 to 8 percent slopes, moderately eroded.	(2)	2–7		
HfC2	Hagerstown silty clay loam, 8 to 15 percent slopes, moderately eroded.	(2)	2–7		
HfD2	Hagerstown silty clay loam, 15 to 25 percent slopes, moderately eroded.	(2)	2–7		
HgC2	Hagerstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded.	(2)	0–7		
HgE2	Hagerstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded.	(2)	0–7		
HhC2	Hagerstown very rocky silty clay loam, 3 to 15 percent slopes, moderately eroded.	(2)	0–7		
HhC3	Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded.	(2)	0–6		

See footnotes at end of table.

estimated physical properties—Continued

USDA textural class	Engineering classification		Percentage passing sieve—			Selected characteristics significant in engineering			
	Unified	AASHO	No. 4	No. 10	No. 200	Range in permeability	Reaction	Dispersion	Shrink-swell potential
			Percent	*Percent*	*Percent*	*Inches per hour*	*pH*		
Channery silt loam	ML	A-4	85	80	60	0.6–2.0	5.6–6.0	Low to moderate.	Low.
Channery silty clay loam	CL	A-6	70	65	55	0.2–0.6	5.1–6.0	Low to moderate.	Moderate.
Fragmented shale	GM	A-2	25	20	10		5.6–6.0		None.
Shaly cherty limestone									
Cherty silt loam	ML	A-4	85	80	60	0.6–2.0	5.1–6.5	Moderate to high.	Low.
Cherty silty clay loam	CL	A-6	95	85	70	0.2–0.6	4.0–5.0	Low to moderate.	Moderate.
Cherty clay loam to clay	CH	A-7	95	90	80	0.06–0.2	6.6–7.3	High	High.
Silt loam	ML	A-4	98	95	75	0.6–2.0	5.1–7.3	Moderate	Low.
Silty clay loam	CL	A-6	100	100	85	0.06–0.6	5.6–6.0	Low to moderate.	Moderate.
Silty clay to clay	CH	A-7	100	100	90	0.06–0.2	5.6–6.5	Low	High.
Silty clay loam	CL	A-6	95	90	80	0.06–0.2	5.6–6.5	High	Moderate.
Massive limestone									

TABLE 6.—*Brief description of soils and their*

Map symbol	Soil name	Depth to seasonally high water table	Depth to bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet	*Feet*		*Inches*
HnB2	Hazel channery silt loam, 0 to 10 percent slopes, moderately eroded.	(2)	1–2	Very shallow, excessively drained, upland soils developed in residuum from hard, very resistant phyllite. The severely eroded soils consist of about 12 inches of soil over bedrock.	0–24
HnC2	Hazel channery silt loam, 10 to 20 percent slopes, moderately eroded.	(2)	1–2		24+
HnC3	Hazel channery silt loam, 10 to 20 percent slopes, severely eroded.	(2)	1		
HnD2	Hazel channery silt loam, 20 to 30 percent slopes, moderately eroded.	(2)	1–2		
HnD3	Hazel channery silt loam, 20 to 30 percent slopes, severely eroded.	(2)	1		
HnE	Hazel channery silt loam, 30 to 45 percent slopes.	(2)	1–2		
HoB	Highfield gravelly loam, 0 to 5 percent slopes	(2)	4–6	Deep, well-drained, upland soils developed in residuum from metabasalt or greenstone. Physical properties given are for the very stony loam, which has 20 to 40 percent of the surface area occupied by stones or boulders. The gravelly loam is essentially the same, except that it is gravelly instead of very stony.	0–36
HoB2	Highfield gravelly loam, 5 to 10 percent slopes, moderately eroded.	(2)	4–6		36–52
HoC2	Highfield gravelly loam, 10 to 20 percent slopes, moderately eroded.	(2)	4–6		52+
HoE2	Highfield gravelly loam, 20 to 35 percent slopes, moderately eroded.	(2)	4–6		
HpB	Highfield very stony loam, 0 to 5 percent slopes.	(2)	4–6		
HpD	Highfield very stony loam, 5 to 30 percent slopes.	(2)	4–6		
HpE	Highfield very stony loam, 30 to 45 percent slopes.	(2)	4–6		
HrA	Holston gravelly loam, 0 to 3 percent slopes	4+	(1)	Well-drained, deep soils on high terraces, of very old alluvium from shale and sandstone areas. Physical properties given are for the silt loam. The gravelly loam is essentially the same, except that the surface layer contains about 20 percent waterworn gravel. The gravelly sandy loam is SM throughout and contains considerable gravel. Severely eroded soils have lost up to half the original solum.	0–24
HrB2	Holston gravelly loam, 0 to 8 percent slopes, moderately eroded.	4+	(1)		24–37
HrC2	Holston gravelly loam, 8 to 15 percent slopes, moderately eroded.	4+	(1)		37–42+
HrD2	Holston gravelly loam, 15 to 25 percent slopes, moderately eroded.	4+	(1)		
HrD3	Holston gravelly loam, 8 to 25 percent slopes, severely eroded.	4+	(1)		
HrE2	Holston gravelly loam, 25 to 45 percent slopes, moderately eroded.	4+	(1)		
HsB	Holston gravelly sandy loam, 3 to 8 percent slopes.	4+	(1)		
HsC2	Holston gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.	4+	(1)		
HsC3	Holston gravelly sandy loam, 8 to 15 percent slopes, severely eroded.	4+	(1)		
HtA	Holston silt loam, 0 to 3 percent slopes	4+	(1)		
HtB2	Holston silt loam, 3 to 8 percent slopes, moderately eroded.	4+	(1)		
HtC2	Holston silt loam, 8 to 15 percent slopes, moderately eroded.	4+	(1)		
Hu	Huntington fine sandy loam	4	(1)	Well-drained, deep soils of flood plains and upland depressions, of recent alluvium from areas of limestone-derived soils. Physical properties given are for the silt loam. The gravelly loam contains about 20 percent waterworn gravel. The fine sandy loam is SM or ML throughout.	0–48+
Hv	Huntington gravelly loam	4	(1)		
Hw	Huntington silt loam	4	(1)		
Hx	Huntington silt loam, local alluvium	4	(1)		
LaA	Laidig gravelly loam, 0 to 3 percent slopes	8+	(1)	Well-drained soils developed in gravelly to stony colluvial deposits of quartzitic sandstone materials. Physical properties given are for the gravelly loam. The very stony loam has up to 40 percent of the surface occupied by stones.	0–38
LaB2	Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded.	8+	(1)		38–90+
LaC2	Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded.	8+	(1)		
LaD2	Laidig gravelly loam, 15 to 25 percent slopes, moderately eroded.	8+	(1)		
LbD	Laidig very stony loam, 8 to 25 percent slopes	8+	(1)		
LbE2	Laidig very stony loam, 15 to 45 percent slopes, moderately eroded.	8+	(1)		

See footnotes at end of table.

estimated physical properties—Continued

USDA textural class	Engineering classification		Percentage passing sieve—			Selected characteristics significant in engineering			
	Unified	AASHO	No. 4	No. 10	No. 200	Range in permeability	Reaction	Dispersion	Shrink-swell potential
			Percent	*Percent*	*Percent*	*Inches per hour*	*pH*		
Channery silt loam	GM	A-2	50	40	30	0. 6–6. 3	5. 1–6. 5	High to moderate.	Low.
Hard phyllite									
Loam to light silt loam	ML	A-4	95	90	65	0. 2–2. 0	4. 5–5. 5	Low to high	Low to moderate.
Gravelly silt loam	GM	A-2	60	45	30	0. 2–0. 6	5. 1–5. 5	High	Low.
Hard metabasalt									
Silt loam	ML	A-4	95	85	65	0. 6–2. 0	4. 5–5. 5	High to moderate.	Low.
Gravelly silty clay loam	CL	A-6	80	75	60	0. 2–0. 6	4. 5–5. 0	Low	Moderate.
Very gravelly sandy clay loam.	GC	A-2	60	45	25	0. 2–0. 6	4. 0–4. 5	High	Low.
Silt loam	ML	A-4	100	100	80	0. 2–2. 0	6. 6–7. 3	High to moderate.	Low.
Gravelly fine sandy loam	SM	A-2	80	70	30	0. 2–6. 3	4. 5–5. 5	High to moderate.	Low.
Fine sandy clay loam	SC	A-2	100	95	35	0. 2–0. 6	4. 5–5. 0	Moderate	Low.

TABLE 6.—*Brief description of soils and their*

Map symbol	Soil name	Depth to seasonally high water table	Depth to bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet	*Feet*		*Inches*
LcB2	Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded.	[3] 1	(1)	Moderately well drained soils developed in colluvial deposits of cherty limestone material. Moderately wet.	0–12
LcD2	Landisburg cherty silt loam, 8 to 25 percent slopes, moderately eroded.	[3] 1	(1)		12–42+
Le	Largent silt loam	2	(1)	Moderately well drained soils of flood plains, of recent alluvium from acid red shale and sandstone material. Moderately wet.	0–25 25–48+
LgA	Leadvale gravelly silt loam, 0 to 3 percent slopes.	[3] 2	(1)	Moderately well drained soils developed in gravelly colluvial deposits of acid shale material. Moderately wet.	0–22
LgB2	Leadvale gravelly silt loam, 3 to 8 percent slopes, moderately eroded.	[3] 2	(1)		22–42+
Lm	Lindside silt loam	1–2	(1)	Moderately well drained to somewhat poorly drained soils of flood plains and upland depressions, of recent alluvium from limestone-derived soils. Moderately wet; occasionally flooded.	0–40
Ln	Lindside silt loam, local alluvium	1–2	(1)		40–60+
LoB2	Litz channery loam, 3 to 10 percent slopes, moderately eroded.	(2)	1–2	Somewhat excessively drained to excessively drained, shallow upland soils developed in residuum from limy shale, or sometimes limestone. Physical properties given are for Litz shaly loam. The channery loams contain large, flat fragments of coarse skeletal material. Severely eroded soils have lost at least half of the original soil material above bedrock.	0–3
LoC2	Litz channery loam, 10 to 20 percent slopes, moderately eroded.	(2)	1–2		3–16
LoC3	Litz channery loam, 10 to 20 percent slopes, severely eroded.	(2)	1		16+
LsB	Litz shaly loam, 0 to 10 percent slopes	(2)	1–2		
LsB2	Litz shaly loam, 3 to 10 percent slopes, moderately eroded.	(2)	1–2		
LsC2	Litz shaly loam, 10 to 20 percent slopes, moderately eroded.	(2)	1–2		
LsC3	Litz shaly loam, 10 to 20 percent slopes, severely eroded.	(2)	1		
LsD2	Litz shaly loam, 20 to 30 percent slopes, moderately eroded.	(2)	1–2		
LsD3	Litz shaly loam, 20 to 30 percent slopes, severely eroded.	(2)	1		
LsE2	Litz shaly loam, 30 to 45 percent slopes, moderately eroded.	(2)	1–2		
LsE3	Litz shaly loam, 30 to 45 percent slopes, severely eroded.	(2)	1		
LsF	Litz shaly loam, 45 to 60 percent slopes	(2)	1–2		
LtB	Litz-Teas channery silt loams, 0 to 8 percent slopes.	(2)	1–2	These areas are mixtures of Litz channery silt loam and Teas channery silt loam that could not be separated on the maps at the scale used. Physical properties given are for Teas channery silt loam. The Teas soils are somewhat excessively drained to excessively drained upland soils developed in residuum from limy shale and sandstone. Severely eroded soils have lost at least half of the original soil material above bedrock.	0–11
LtC2	Litz-Teas channery silt loams, 3 to 15 percent slopes, moderately eroded.	(2)	1–2		11–20
LtC3	Litz-Teas channery silt loams, 8 to 15 percent slopes, severely eroded.	(2)	1		20+
LtD2	Litz-Teas channery silt loams, 15 to 25 percent slopes, moderately eroded.	(2)	1–2		
LtD3	Litz-Teas channery silt loams, 15 to 25 percent slopes, severely eroded.	(2)	1		
LtE2	Litz-Teas channery silt loams, 25 to 45 percent slopes, moderately eroded.	(2)	1–2		
Me	Melvin silt loam	0–1	(1)	Poorly drained soils of flood plains, of recent alluvium from limestone-derived soils. Very wet; occasionally flooded.	0–18 18–36+
MgB2	Monongahela gravelly loam, 3 to 8 percent slopes, moderately eroded.	[3] 2	(1)	Moderately well drained soils of high terraces, of very old alluvium from acid shale and sandstone materials. Physical properties given are for the gravelly loam. The silt loam contains very little gravel above a depth of about 50 inches.	0–18 18–50
MgC2	Monongahela gravelly loam, 8 to 15 percent slopes, moderately eroded.	[3] 2	(1)		50+
MhA	Monongahela silt loam, 0 to 3 percent slopes	[3] 2	(1)		
MhB2	Monongahela silt loam, 3 to 8 percent slopes, moderately eroded.	[3] 2	(1)		
MhC2	Monongahela silt loam, 8 to 15 percent slopes, moderately eroded.	[3] 2	(1)		
MhD2	Monongahela silt loam, 15 to 25 percent slopes, moderately eroded.	[3] 2	(1)		

See footnotes at end of table.

estimated physical properties—Continued

USDA textural class	Engineering classification		Percentage passing sieve—			Selected characteristics significant in engineering			
	Unified	AASHO	No. 4	No. 10	No. 200	Range in permeability	Reaction	Dispersion	Shrink-swell potential
			Percent	*Percent*	*Percent*	*Inches per hour*	*pH*		
Cherty silt loam	ML	A-4	80	70	55	0. 06–0. 6	4. 5–5. 5	Low to moderate.	Low.
Cherty clay loam to clay	CL or CH	A-6 or A-7	75	70	65	0. 02–0. 2	4. 5–5. 0	Low	High to moderate.
Silt loam	ML	A-4	100	95	60	0. 2–2. 0	5. 6–6. 5	High	Low.
Fine sandy loam	SM	A-2	100	95	25	0. 2–0. 6	5. 6–6. 0	High	Low.
Gravelly silt loam	ML	A-4	85	75	60	0. 2–2. 0	4. 5–5. 5	Moderate	Low.
Channery silty clay loam	CL	A-6	80	75	65	0. 02–0. 2	4. 5–5. 5	Low to moderate.	Moderate.
Silt loam	ML	A-4	98	95	80	0. 06–0. 6	6. 1–7. 9	High	Low.
Gravelly loam	GM	A-2	55	40	25	0. 06–0. 6	7. 9–8. 4	High	Low.
Shaly loam	ML	A-4	85	80	55	0. 6–2. 0	4. 5–5. 5	High to moderate.	Low.
Very shaly silt loam	GM	A-2	60	45	30	0. 6–2. 0	5. 1–5. 5	Moderate	Low.
Shale and some limestone									
Channery silt loam	ML	A-4	80	75	50	0. 6–2. 0	5. 6–6. 5	High to moderate.	Low.
Fragmented shale and sandstone.	GM to GP	A-2 or A-1	25	15	10				
Hard shale and sandstone									
Silt loam	ML	A-4	100	100	80	0. 2–0. 6	7. 4–8. 4	High to moderate.	Low.
Silty clay loam	CL	A-6	100	100	85	0. 06–0. 2	7. 4–8. 4	Low	Moderate.
Gravelly loam	ML	A-4	80	70	55	0. 2–0. 6	5. 6–6. 0	Low to high	Low.
Gravelly silty clay loam	CL	A-6	80	75	60	0. 02–0. 06	4. 5–5. 0	Low	Moderate.
Very gravelly loam	GM	A-2	55	40	25	0. 2–0. 6	4. 0–4. 5	Moderate	Low.

TABLE 6.—*Brief description of soils and their*

Map symbol	Soil name	Depth to seasonally high water table	Depth to bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet	*Feet*		*Inches*
MmB2	Montevallo shaly loam, 0 to 10 percent slopes, moderately eroded.	(2)	1–2	Very shallow, excessively drained upland soils, developed in residuum from acid shale. Severely eroded soils have lost at least half of the original soil material above bedrock.	0–12
MmC2	Montevallo shaly loam, 10 to 20 percent slopes, moderately eroded.	(2)	1–2		12+
MmC3	Montevallo shaly loam, 10 to 20 percent slopes, severely eroded.	(2)	1		
MmD2	Montevallo shaly loam, 20 to 30 percent slopes, moderately eroded.	(2)	1–2		
MmD3	Montevallo shaly loam, 20 to 30 percent slopes, severely eroded.	(2)	1		
MoA	Murrill gravelly loam, 0 to 3 percent slopes	6+	(4)	Deep, well-drained soils on colluvial deposits of sandstone material over limestone residuum or limestone. Physical properties given are for the silt loam. The gravelly loam is essentially the same, but contains about 15 to 25 percent gravel in the solum. The gravelly sandy loam will be a gravelly SM throughout. Severely eroded soils have lost most of the original surface layer, and there are occasional gullies. Rarely, there are outcrops of limestone.	0–17
MoB2	Murrill gravelly loam, 0 to 8 percent slopes, moderately eroded.	6+	(4)		17–72+
MoC2	Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded.	6+	(4)		
MoD2	Murrill gravelly loam, 15 to 25 percent slopes, moderately eroded.	6+	(4)		
MoD3	Murrill gravelly loam, 8 to 25 percent slopes, severely eroded.	6+	(4)		
MoE2	Murrill gravelly loam, 25 to 45 percent slopes, moderately eroded.	6+	(4)		
MrB	Murrill gravelly sandy loam, 0 to 8 percent slopes.	6+	(4)		
MrC2	Murrill gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.	6+	(4)		
MrC3	Murrill gravelly sandy loam, 8 to 15 percent slopes, severely eroded.	6+	(4)		
MrD2	Murrill gravelly sandy loam, 15 to 25 percent slopes, moderately eroded.	6+	(4)		
MrD3	Murrill gravelly sandy loam, 15 to 25 percent slopes, severely eroded.	6+	(4)		
MsA	Murrill silt loam, 0 to 3 percent slopes	6+	(4)		
MsB2	Murrill silt loam, 0 to 8 percent slopes, moderately eroded.	6+	(4)		
MsC2	Murrill silt loam, 8 to 15 percent slopes, moderately eroded.	6+	(4)		
MvA	Myersville channery loam, 0 to 3 percent slopes.	(2)	5–7	Well-drained, deep, upland soils developed in residuum from greenstone or metabasalt. Physical properties given are for the silt loam. The channery loam and the channery silt loam are essentially the same as the silt loam, except that they contain about 20 percent flat stone fragments in the surface layer. The very stony loam contains 20 to 40 percent stones in the surface layer. Severely eroded soils have lost most of the original ML surface layer, and have occasional to frequent gullies, some very deep.	0–8 8–46 46–60+
MvB2	Myersville channery loam, 3 to 10 percent slopes, moderately eroded.	(2)	5–7		
MvC2	Myersville channery loam, 10 to 20 percent slopes, moderately eroded.	(2)	5–7		
MvD2	Myersville channery loam, 20 to 30 percent slopes, moderately eroded.	(2)	5–7		
MvE2	Myersville channery loam, 30 to 45 percent slopes, moderately eroded.	(2)	5–7		
MwB3	Myersville channery silt loam, 3 to 10 percent slopes, severely eroded.	(2)	3–6		
MwD3	Myersville channery silt loam, 10 to 30 percent slopes, severely eroded.	(2)	3–6		
MxA	Myersville silt loam, 0 to 3 percent slopes	(2)	5–7		
MxB2	Myersville silt loam, 3 to 10 percent slopes, moderately eroded.	(2)	5–7		
MxC2	Myersville silt loam, 10 to 20 percent slopes, moderately eroded.	(2)	5–7		
MyE2	Myersville very stony loam, 3 to 30 percent slopes, moderately eroded.	(2)	3–7		
MyF2	Myersville very stony loam, 30 to 55 percent slopes, eroded.	(2)	3–7		
Pg	Philo gravelly sandy loam	1	(1)	Somewhat poorly drained soils of flood plains, of recent alluvium from acid sandstone and shale materials. Wet to moderately wet; occasionally flooded. Physical properties given are for the silt loam. The gravelly sandy loam will be SM throughout.	0–20
Ph	Philo silt loam	1	(1)		20–40+

See footnotes at end of table.

estimated physical properties—Continued

USDA textural class	Engineering classification		Percentage passing sieve—			Selected characteristics significant in engineering			
	Unified	AASHO	No. 4	No. 10	No. 200	Range in permeability	Reaction	Dispersion	Shrink-swell potential
			Percent	*Percent*	*Percent*	*Inches per hour*	*pH*		
Shaly loam	GM	A-2	55	45	30	0. 6–6. 3	5. 1–5. 5	Low to moderate.	Low.
Hard shale									
Silt loam	ML	A-4	95	90	65	0. 6–2. 0	6. 1–6. 5	Moderate	Low.
Silty clay loam	CL	A-6	98	95	85	0. 06–0. 6	5. 1–6. 5	Low to high	Moderate.
Silt loam	ML	A-4	95	90	75	0. 6–2. 0	5. 1–6. 0	Moderate	Low.
Silty clay loam	CL	A-6	98	95	85	0. 2–0. 6	4. 5–5. 5	Low to high	Moderate.
Clay loam	CL	A-6 or A-7	100	100	80	0. 2–0. 6	5. 1–5. 5	High	Moderate.
Silt loam	ML	A-4	100	100	75	0. 2–0. 6	5. 1–6. 0	High	Low.
Silty clay loam	ML or CL	A-4 or A-6	100	100	80	0. 06–0. 2	5. 1–5. 5	High	Moderate.

TABLE 6.—*Brief description of soils and their*

Map symbol	Soil name	Depth to seasonally high water table	Depth to bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet	*Feet*		*Inches*
Pn	Pope fine sandy loam	3–4	(1)	Deep, well-drained soils of flood plains, of recent alluvium from acid shale and sandstone materials. Infrequently flooded. Physical properties given are for the fine sandy loam. The gravelly loam and the silt loam are essentially the same as the fine sandy loam, except that they contain gravel. The gravelly sandy loam will be SM throughout. Stones or boulders cover about 20 percent of the stony gravelly loam.	0–46
Po	Pope gravelly loam	3–4	(1)		46+
Pp	Pope gravelly sandy loam	3–4	(1)		
Ps	Pope silt loam	3–4	(1)		
Pt	Pope stony gravelly loam	3–4	(1)		
RoB2	Rohrersville silty clay loam, 0 to 8 percent slopes, moderately eroded.	0–1	(1)	Poorly drained soils developed in deposits of colluvial fines of metabasaltic materials. Wet for considerable periods of time but seldom, if ever, flooded.	0–36+
TaC2	Talladega gravelly silt loam, thick solum variant, 0 to 20 percent slopes, moderately eroded.	(2)	4+	Well-drained upland soils developed in residuum from mica schist with a surface layer of colluvial sandstone debris. Severely eroded soils have lost the original ML surface layer and part of the MH subsoil.	0–7
TaC3	Talladega gravelly silt loam, thick solum variant, 10 to 20 percent slopes, severely eroded.	(2)	2–3		7–42+
TaD	Talladega gravelly silt loam, thick solum variant, 20 to 30 percent slopes.	(2)	4+		
TaE2	Talladega gravelly silt loam, thick solum variant, 20 to 45 percent slopes, moderately eroded.	(2)	4+		
ThB2	Thurmont gravelly loam, 3 to 8 percent slopes, moderately eroded.	5+	(1)	Well-drained soils developed in gravelly colluvial deposits of metabasaltic materials, with some sandstone and quartzite.	0–15
ThC2	Thurmont gravelly loam, 8 to 15 percent slopes, moderately eroded.				15–40
					40–48+
TrA	Trego gravelly silt loam, 0 to 3 percent slopes	3 2	(1)	Moderately well drained soils developed in colluvial deposits of quartzite, metabasalt, and sandstone materials. Moderately wet.	0–11
TrC2	Trego gravelly silt loam, 3 to 15 percent slopes, moderately eroded.	3 2	(1)		11–36
					36–48+
TyB	Tyler silt loam, 0 to 8 percent slopes	0–1	(1)	Poorly drained soils on terraces of very old alluvium from acid sandstone and shale materials. Very wet.	0–5
					5–25
					25–42+
Wa	Warners loam, 0 to 8 percent slopes	1–2	(1)	Soils on flood plains, of variable drainage, of marl deposits and recent alluvium from limestone areas.	0–38
					38–48
					48+
WbA	Waynesboro gravelly loam, 0 to 3 percent slopes.	4+	(1)	Deep, well-drained soils of high terraces, well oxidized, of very old alluvium from sandstone and other sedimentary rocks. Physical properties given are for the gravelly loam. Gravelly sandy loam has essentially the same properties, except that it is SM throughout to GC substratum. Severely eroded soils have lost the original surface layer and part of the subsoil; occasional to frequent gullies, some into the substratum.	0–8
WbB2	Waynesboro gravelly loam, 0 to 8 percent slopes, moderately eroded.	4+	(1)		8–14
					14–35
					35–43+
WbC2	Waynesboro gravelly loam, 8 to 15 percent slopes, moderately eroded.	4+	(1)		
WbC3	Waynesboro gravelly loam, 3 to 15 percent slopes, severely eroded.	3+	(1)		
WbD2	Waynesboro gravelly loam, 15 to 25 percent slopes, moderately eroded.	4+	(1)		
WbD3	Waynesboro gravelly loam, 15 to 25 percent slopes, severely eroded.	4+	(1)		
WbE2	Waynesboro gravelly loam, 25 to 45 percent slopes, moderately eroded.	4+	(1)		
WgB	Waynesboro gravelly sandy loam, 0 to 8 percent slopes.	4+	(1)		
WgC2	Waynesboro gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.	4+	(1)		
WgC3	Waynesboro gravelly sandy loam, 8 to 15 percent slopes, severely eroded.	3+	(1)		
WgD2	Waynesboro gravelly sandy loam, 15 to 25 percent slopes, moderately eroded.	4+	(1)		

See footnotes at end of table.

estimated physical properties—Continued

USDA textural class	Engineering classification		Percentage passing sieve—			Selected characteristics significant in engineering			
	Unified	AASHO	No. 4	No. 10	No. 200	Range in permeability	Reaction	Dispersion	Shrink-swell potential
			Percent	*Percent*	*Percent*	*Inches per hour*	*pH*		
Fine sandy loam to light silt loam.	ML	A-4	100	100	50	0. 2–2. 0	5. 1–6. 0	High	Low.
Gravelly loam	GM	A-2	50	40	25	2. 0–6. 3		High	Very low.
Silty clay loam	CL or ML	A-6	100	98	70	0. 02–0. 6	5. 1–6. 0	High to moderate.	Moderate.
Gravelly silt loam	ML	A-4	85	80	55	0. 6–2. 0	4. 5–5. 0	High to moderate.	Low.
Gravelly or channery silty clay loam.	MH	A-5 or A-7	95	90	75	0. 2–0. 6	4. 5–5. 5	High to moderate.	Moderate.
Gravelly loam	ML or SM	A-4	80	70	45	0. 6–2. 0	5. 6–6. 5	Moderate	Low.
Gravelly silt loam	ML	A-4	85	75	60	0. 2–0. 6	5. 1–6. 0	High to moderate.	Low.
Gravelly loam	GM	A-2	55	45	30	0. 6–2. 0	4. 5–5. 0	High	Low.
Gravelly silt loam	ML	A-4	85	80	55	0. 6–2. 0	5. 6–6. 5	Moderate	Low.
Gravelly sandy clay loam	SC	A-4	80	70	45	0. 06–0. 6	4. 5–5. 0	Low to moderate.	Low.
Gravelly sandy clay	SC or CL	A-6	80	65	50	0. 02–0. 06	4. 0–5. 0	High	Low.
Silt loam	ML	A-4	100	100	80	0. 2–0. 6	4. 0–5. 0	Low	Low.
Silty clay loam	CL	A-6	100	100	85	0. 02–0. 2	4. 0–5. 0	Moderate	Moderate.
Clay	CH	A-7	100	100	90	0. 0–0. 02	4. 0–4. 5	High	High.
Loam	SM	A-2	98	95	30	0. 2–0. 6	7. 9–8. 4	Low to moderate.	Moderate.
Sandy clay loam	SC	A-6	100	95	45	0. 06–0. 2	7. 9–9. 0	High	Moderate.
Silty clay	CH	A-7	100	98	80	0. 06–0. 2	7. 9–9. 0	High	High.
Gravelly loam	SM or ML	A-4	85	80	50	0. 6–2. 0	4. 5–5. 0	Moderate	Low.
Gravelly silt loam	ML	A-4	85	80	55	0. 2–0. 6	4. 0–4. 5	Moderate	Low.
Gravelly clay loam	CL	A-6	85	80	60	0. 2–0. 6	4. 0–4. 3	Low	Moderate.
Very gravelly sandy clay	GC	A-2	60	55	30	0. 2–2. 0	4. 0–4. 5	Low	Moderate.

TABLE 6.—*Brief description of soils and their*

Map symbol	Soil name	Depth to seasonally high water table	Depth to bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet	*Feet*		*Feet*
Wh	Wehadkee silt loam	0–1	(1)	Poorly drained soils of flood plains, of recent alluvium from areas of crystalline rocks. Very wet; frequently flooded.	0–12 12–36+
WmB2	Westmoreland channery silt loam, 3 to 10 percent slopes, moderately eroded.	(2)	4	Well-drained upland soils developed in residuum from acid and limy shales, with some sandstone and limestone. Severely eroded soils have lost most or all of the original ML horizon, and have occasional to frequent shallow gullies.	0–14 14–32 32–42+
WmC2	Westmoreland channery silt loam, 10 to 20 percent slopes, moderately eroded.	(2)	4		
WmC3	Westmoreland channery silt loam, 3 to 20 percent slopes, severely eroded.	(2)	3		
WmD2	Westmoreland channery silt loam, 20 to 30 percent slopes, moderately eroded.	(2)	4		
WmD3	Westmoreland channery silt loam, 20 to 30 percent slopes, severely eroded.	(2)	3		

[1] These soils consist of unconsolidated, stratified material that is old or new alluvium or colluvium; depth to bedrock is variable but undetermined.

[2] In most residual soils, depth to water table cannot be estimated, but, normally, the water table is in the bedrock.

[3] These soils have a slowly permeable fragipan in the subsoil. At times, a perched water table is directly above the fragipan and is separated from a lower, more permanent water table by a layer of dry or nearly dry soil.

TABLE 7.—*Soil characteristics*

Map symbol	Soil	Suitability for winter grading	Susceptibility to frost action	Suitability for septic tank sites [1]	Suitability as material for—	
					Road subgrade	Road fill
AsB	Ashton fine sandy loam	Not suitable	Moderate	Poor (flooding)	Fair	Fair to good
At	Atkins silt loam	Not suitable	Very strong	Not suitable	Very poor [3]	Very poor [3]
BaA, BaB2, BaC2, BaC3.	Benevola clay loam	Not suitable	Moderate	Fair to good	Poor to fair	Poor to fair
BcB2, BcC2, BcC3, BcD2.	Berks channery loam, ridges	Not suitable	Slight to moderate.	Poor to fair	Good	Good
BeB, BeB2, BeC2, BeD2.	Berks shaly silt loam	Not suitable	Slight to moderate.	Poor to fair	Good	Good
BkB2, BkC2, BkC3, BkD2.	Berks silt loam, ridges	Not suitable	Slight to moderate.	Poor to fair	Good	Good
BoE3, BoF	Berks soils, ridges	Not suitable	Slight to moderate.	Not suitable	Good	Good
BrB2, BrC2, BrD.	Braddock and Thurmont gravelly loams.	Not suitable	Moderate	Good	Good	Good
BtB	Brinkerton silt loam	Not suitable	Very strong	Not suitable	Very poor	Very poor
BuA, BuB2, BuC2, BuD2.	Buchanan gravelly loam	Not suitable	Strong	Poor	Poor [3]	Poor [3]
CaB2	Calvin channery fine sandy loam.	Fair	Slight to moderate.	Fair	Good	Good
CcB2, CcC2, CcD, CcD2, CcE, CcF.	Calvin channery loam	Not suitable	Slight to moderate.	Poor to fair	Good	Good

See footnotes at end of table.

estimated physical properties—Continued

USDA textural class	Engineering classification		Percentage passing sieve—			Selected characteristics significant in engineering			
	Unified	AASHO	No. 4	No. 10	No. 200	Range in permeability	Reaction	Dispersion	Shrink-swell potential
			Percent	*Percent*	*Percent*	*Inches per hour*	*pH*		
Silt loam	ML	A-4	100	100	75	0. 2–0. 6	4. 5–5. 5	High	Low.
Silty clay loam to sandy clay.	CL	A-6	100	100	80	0. 02–0. 2	4. 5–5. 5	High to moderate.	Moderate.
Channery silt loam	ML	A-4	80	75	60	0. 2–0. 6	5. 6–6. 5	Moderate	Low.
Shaly silty clay loam	CL	A-6	85	80	65	0. 2–2. 0	5. 1–6. 0	Low to moderate.	Moderate.
Very shaly loam	GM	A-2	60	45	25	0. 6–2. 0	5. 6–6. 5	High	Low.

[4] In the Murrill soils, depth to bedrock is normally fairly great, but in some places the colluvial material, from which at least the uppermost part of the soil has been formed, is thin. In some such areas, hard limestone is within a few feet of the surface; in rare instances, there are limestone outcrops. In general, however, the depth to bedrock cannot be estimated.

that affect engineering

Suitability as source of—		Factors that affect engineering practices for—							
Topsoil	Sand and gravel	Vertical alinement of highways		Farm ponds		Agricultural drainage	Irrigation [2]	Terraces and diversions	Waterways
		Material	Drainage	Reservoir areas	Embankments				
Excellent	Not suitable.		Occasional flooding.	On low terraces.	Very high in silt.	Not needed	No limitations.	Erodible	Erodible.
Poor to fair.	Not suitable.	Very poor stability.	Flooding; high water table.	Flood plain	Very poor stability.	Very slow permeability.	Poor drainage.	Highly erodible.	Highly erodible.
Very good.	Fine sand substrata.	Fine clay	None	Sandy substrata.	Fine clay	Not needed	Fine clay	Erodible	Erodible.
Poor to fair.	Not suitable.	Shallow to bedrock.	None	Shaly substrata.	Shaly	Not needed	Shallow	Shallow	Erodible, droughty.
Poor to fair.	Not suitable.	Shallow to bedrock.	None	Shaly substrata.	Shaly	Not needed	Shallow	Shallow	Erodible, droughty.
Poor to fair.	Not suitable.	Shallow to bedrock.	None	Shaly substrata.	Shaly	Not needed	Shallow	Shallow	Erodible, droughty.
Poor	Not suitable.	Shallow to bedrock.	None	Shaly, steep.	Shaly	Not needed	Shallow, steep.	Shallow, steep.	Erodible, droughty.
Fair to good.	Local gravel substrata.		None	Gravel substrata.	Gravelly	Not needed	No limitations.	Erodible	Erodible.
Poor to fair.	Not suitable.	Fine clay	High water table.		Fine clay	Very slow permeability.	Poor drainage.	Very slow permeability.	Highly erodible.
Fair	Not suitable.	Fragipan	High water table.	Fragipan	Fragipan	Fragipan	Fragipan	Slow permeability.	Erodible.
Fair	Not suitable.	Shallow to bedrock.	None	Shaly substrata.	Shaly	Not needed	Shallow	Shallow	Erodible, droughty.
Poor to fair.	Not suitable.	Shallow to bedrock.	None	Shaly substrata.	Shaly	Not needed	Shallow	Shallow	Erodible, droughty.

TABLE 7.—*Soil characteristics*

Map symbol	Soil	Suitability for winter grading	Susceptibility to frost action	Suitability for septic tank sites [1]	Suitability as material for—	
					Road subgrade	Road fill
CmB2, CmC2, CmC3, CmD, CmE.	Calvin shaly loam	Not suitable	Slight to moderate.	Poor to fair	Good	Good
CnB2, CnC2, CnC3, CnD2, CnF2.	Calvin-Berks channery loams	Not suitable	Slight to moderate.	Poor to fair	Good	Good
CoB2, CoC2, CoD2, CoE3, CoF.	Calvin-Montevallo shaly loams	Not suitable	Slight to moderate.	Poor to fair	Good	Good
CrB, CrB2, CrC2, CrD.	Chandler silt loam and channery silt loam.	Not suitable	Moderate	Poor to fair	Fair	Fair
Cs	Chewacla gravelly sandy loam	Not suitable	Strong	Not suitable	Poor [3]	Poor [3]
Ct	Chewacla silt loam	Not suitable	Strong	Not suitable	Poor [3]	Poor [3]
Cu	Chewacla stony silt loam	Not suitable	Strong	Not suitable	Poor [3]	Poor [3]
Cv	Congaree silt loam and gravelly loam.	Not suitable	Moderate to strong.	Not suitable	Fair	Good
CwA, CwB2, CwC2	Corydon clay loam	Not suitable	Moderate	Poor	Poor	Poor
CxC	Corydon extremely rocky clay loam.	Not suitable	Moderate	Poor	Poor	Poor
CyE2	Corydon very rocky clay loam	Not suitable	Moderate	Poor	Poor	Poor
DeD, DeE, DeF	Dekalb and Leetonia very stony sandy loams.	Poor to fair	Slight to moderate.	Fair to good	Good	Good
DkD, DkE	Dekalb and Lehew very stony loams.	Poor to fair	Slight to moderate.	Fair to good	Good	Good
DuC	Duffield extremely rocky silt loam.	Not suitable	Moderate	Poor to fair	Poor to fair	Poor to fair
DmA, DmB2, DmC2, DmD2, DmD3.	Duffield silt loam	Not suitable	Moderate	Good	Fair to good	Fair to good
DvC, DvE2	Duffield very rocky silt loam	Not suitable	Moderate	Fair to good	Fair	Fair
DyB2, DyC2	Dunmore cherty silt loam	Not suitable	Moderate	Fair	Poor	Poor to fair
Dz	Dunning and Melvin silty clay loams.	Not suitable	Very strong	Not suitable	Very poor [3]	Very poor [3]
EdC, EdD2, EdE2, EdF2.	Edgemont and Laidig channery loams.	Not suitable	Moderate	Good	Good	Good
EgA, EgD, EgF	Edgemont and Laidig very stony loams.	Not suitable	Moderate	Good	Fair	Fair
EhB2, EhD2, EhE2, EhF.	Elliber cherty loam	Not suitable	Slight to moderate.	Good	Good	Good
Em	Eroded land, greenstone materials.	Not suitable	Strong	Not suitable	Fair	Fair
En	Eroded land, limestone materials.	Not suitable	Strong	Not suitable	Fair	Fair

See footnotes at end of table.

that affect engineering—Continued

Suitability as source of—		Factors that affect engineering practices for—							
		Vertical alinement of highways		Farm ponds					
Topsoil	Sand and gravel	Material	Drainage	Reservoir areas	Embankments	Agricultural drainage	Irrigation [2]	Terraces and diversions	Waterways
Poor to fair.	Not suitable.	Shallow to bedrock.	None	Shaly substrata.	Shaly	Not needed	Shallow	Shallow	Erodible, droughty.
Poor to fair.	Not suitable.	Shallow to bedrock.	None	Shaly substrata.	Shaly	Not needed	Shallow	Shallow	Erodible, droughty.
Poor to fair.	Not suitable.	Shallow to bedrock.	None	Shaly substrata.	Shaly	Not needed	Shallow	Shallow	Erodible, droughty.
Fair	Not suitable.	Micaceous	None	Micaceous	Micaceous	Not needed	Shallow	Shallow	Erodible, droughty.
Fair	Local gravel substrata.	Poor stability.	High water table.	Flood plain	Poor stability.	Slow permeability.	Impeded drainage.	Slow permeability.	Erodible.
Fair	Local gravel substrata.	Poor stability.	High water table.	Flood plain	Poor stability.	Slow permeability.	Impeded drainage.	Slow permeability.	Erodible.
Poor	Local gravel substrata.	Stones, boulders.	High water table.	Flood plain, stones.	Stones, boulders.	Slow permeability.	Impeded drainage, stones.	Stones, boulders.	Stones, boulders.
Good	Local sandy gravel substrata.	----------	Flooding	Flood plain	Variable permeability.	Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.	Limestone ledges.	None	Limestone ledges.	Fine clay	Not needed	Shallow; ledges.	Shallow; ledges.	Erodible; ledges.
Poor	Not suitable.	Rockiness	None	Rockiness	Rockiness	Not needed	Rockiness	Rockiness	Rockiness.
Fair	Not suitable.	Rockiness	None	Rockiness	Rockiness	Not needed	Rockiness	Rockiness	Rockiness.
Poor to fair.	Not suitable.	Shallow to bedrock.	None	Permeable substrata.	Stones, boulders.	Not needed	Stones, boulders.	Stones, boulders.	Stones, boulders.
Poor to fair.	Not suitable.	Shallow to bedrock.	None	Permeable substrata.	Stones, boulders.	Not needed	Stones, boulders.	Stones, boulders.	Stones, boulders.
Good	Not suitable.	Rockiness	None	Rockiness	Rockiness	Not needed	Rockiness	Rockiness	Rockiness.
Very good.	Not suitable.	Shallow to bedrock.	None	----------	----------	Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.	Rockiness	None	Rockiness	Rockiness	Not needed	Rockiness	Rockiness	Rockiness.
Very good.	Not suitable.	Fine clay	None	----------	Fine clay	Not needed	Fine clay subsoil.	Erodible	Erodible.
Good	Not suitable.	Very poor stability.	Flooding; high water table.	Flood plain	Very poor stability.	Slow permeability; high water table.	Poor drainage.	Erodible	Erodible.
Fair	Not suitable.	Shallow to bedrock.	None	----------	Channery	Not needed	No limitation.	Erodible	Erodible.
Fair	Not suitable.	Shallow to bedrock.	None	Stones, boulders.	Stones, boulders.	Not needed	Stones, boulders.	Stones, boulders.	Stones, boulders.
Good	Not suitable.	Shallow to bedrock.	None	Permeable substrata.	Cherty	Not needed	No limitation.	Erodible	Erodible
Poor	Not suitable.	Shallow to bedrock.	None	Variable	Variable	----------	----------	Erodible	Erodible.
Poor	Not suitable.	Shallow to bedrock.	None	Variable	Variable	----------	----------	Erodible	Erodible.

TABLE 7.—*Soil characteristics*

Map symbol	Soil	Suitability for winter grading	Susceptibility to frost action	Suitability for septic tank sites [1]	Suitability as material for—	
					Road subgrade	Road fill
Er	Eroded land, sandstone and quartzite materials.	Not suitable	Strong	Not suitable	Fair	Fair
Es	Eroded land, shale and schist materials.	Not suitable	Strong	Not suitable	Poor	Poor
EtA, EtB2, EtC2, EtD2.	Etowah gravelly loam	Not suitable	Moderate	Good	Fair to good	Good
EwA, EwB2, EwC2.	Etowah silt loam	Not suitable	Moderate	Good	Fair to good	Good
FaB, FaB2, FaC2, FaE2.	Fauquier channery loam	Not suitable	Moderate	Good	Fair	Good
FsA, FsB2, FsC2.	Fauquier silt loam	Not suitable	Moderate	Good	Fair	Good
FtC2	Fauquier silt loam, shallow	Not suitable	Moderate	Poor	Fair	Good
FrE	Fauquier very stony loam	Not suitable	Moderate	Fair	Fair	Fair
FuD, FuE	Frankstown extremely rocky silt loam.	Not suitable	Moderate	Poor to fair	Poor to fair	Poor to fair
FvC2, FvC3, FvE2.	Frankstown very rocky silt loam.	Not suitable	Moderate	Fair to good	Fair	Fair
FwA, FwB2, FwB3, FwC2, FwC3, FwD2, FwD3, FwE2, FwE3.	Frankstown and Duffield channery silt loams.	Not suitable	Moderate	Good	Good	Good
FyB2, FyC2, FyC3, FyD2, FyD3, FyE2.	Frederick cherty silt loam	Not suitable	Moderate	Good	Fair	Fair to good
HaA, HaB2, HaB3, HaC2, HaC3, HaD2, HaD3.	Hagerstown clay loam	Not suitable	Moderate	Good	Poor	Poor
HbD2	Hagerstown extremely rocky silt loam.	Not suitable	Moderate	Fair	Poor	Poor
HcD2	Hagerstown extremely rocky silty clay loam.	Not suitable	Moderate	Fair	Poor	Poor
HdE	Hagerstown extremely rocky soils.	Not suitable	Moderate	Not suitable	Poor	Poor
HeA, HeB2, HeC2, HeD2.	Hagerstown silt loam	Not suitable	Moderate	Good	Poor	Poor to fair
HfA, HfB2, HfC2, HfD2.	Hagerstown silty clay loam	Not suitable	Moderate	Good	Poor	Poor to fair
HgC2, HgE2	Hagerstown very rocky silt loam	Not suitable	Moderate	Fair	Poor	Poor
HhC2, HhC3, HhE2.	Hagerstown very rocky silty clay loam	Not suitable	Moderate	Fair	Poor	Poor
HkF	Hagerstown very rocky soils	Not suitable	Moderate	Not suitable	Poor	Poor
HlA	Hagerstown, Corydon, and Duffield very rocky silt loams.	Not suitable	Moderate	Fair	Poor	Poor
HmE2	Hagerstown and Duffield silt loams.	Not suitable	Moderate	Not suitable	Poor	Poor
HnB2, HnC2, HnC3, HnD2, HnD3, HnE.	Hazel channery silt loam	Not suitable	Slight to moderate.	Not suitable	Fair to good	Good
HoB, HoB2, HoC2, HoE2.	Highfield gravelly loam	Not suitable	Moderate	Good	Good	Good
HpB, HpD, HpE.	Highfield very stony loam	Not suitable	Moderate	Good	Fair	Fair
HrA, HrB2, HrC2, HrD2, HrD3, HrE2.	Holston gravelly loam	Not suitable	Moderate	Good	Good	Good

See footnotes at end of table.

that affect engineering—Continued

Suitability as source of—		Factors that affect engineering practices for—							
		Vertical alinement of highways		Farm ponds					
Topsoil	Sand and gravel	Material	Drainage	Reservoir areas	Embankments	Agricultural drainage	Irrigation [2]	Terraces and diversions	Waterways
Poor	Not suitable.	Shallow to bedrock.	Variable	Variable	Variable			Erodible	Erodible.
Poor	Not suitable.	Shallow to bedrock.	None	Variable	Variable			Erodible	Erodible.
Good	Gravelly substrata.		None	Gravelly substrata.		Not needed	No limitation.	Erodible	Erodible.
Good	Gravelly substrata.		None	Gravelly substrata.		Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.		None			Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.		None			Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.		None	Shallow		Not needed	Shallow	Shallow	Shallow; erodible.
Good	Not suitable.	Stones	None	Stones	Stones	Not needed	Stones	Stones	Stones.
Good	Not suitable.	Rockiness.	None	Rockiness.	Rockiness.	Not needed	Rockiness.	Rockiness.	Rockiness.
Good	Not suitable.	Rockiness.	None	Rockiness.	Rockiness.	Not needed	Rockiness.	Rockiness.	Rockiness.
Very good.	Not suitable.		None			Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.	Shallow to bedrock.	None			Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.	Occasional ledges.	None	Occasional ledges.	Fine clay	Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.	Rockiness	None	Rockiness	Rockiness	Not needed	Rockiness	Rockiness	Rockiness.
Good	Not suitable.	Rockiness	None	Rockiness	Rockiness	Not needed	Rockiness	Rockiness	Rockiness.
Good	Not suitable.	Rockiness	None	Rockiness	Rockiness	Not needed		Rockiness	Rockiness.
Very good.	Not suitable.	Occasional ledges.	None	Occasional ledges.	Fine clay	Not needed	No limitation.	Erodible	Erodible.
Very good.	Not suitable.	Occasional ledges.	None	Occasional ledges.	Fine clay	Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.	Rockiness	None	Rockiness	Rockiness	Not needed	Rockiness	Rockiness	Rockiness.
Good	Not suitable.	Rockiness	None	Rockiness	Rockiness	Not needed	Rockiness	Rockiness	Rockiness.
Good	Not suitable.	Rockiness	None	Rockiness	Rockiness	Not needed		Rockiness	Rockiness.
Good	Not suitable.	Rockiness	None	Rockiness	Rockiness	Not needed	Rockiness	Rockiness	Rockiness.
Good	Not suitable.	Occasional ledges.	None	Occasional ledges.	Fine clay	Not needed		Erodible	Erodible.
Poor to fair.	Not suitable.	Shallow to bedrock.	None	Very shallow.	Channery, micaceous.	Not needed	Very shallow.	Very shallow.	Erodible.
Good	Not suitable.	Shallow to bedrock.	None			Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.	Shallow to bedrock.	None	Stones	Stones	Not needed	Stones	Stones	Stones.
Fair	Gravelly substrata.		None	Gravelly substrata.		Not needed	No limitation.	Erodible	Erodible.

TABLE 7.—*Soil characteristics*

Map symbol	Soil	Suitability for winter grading	Susceptibility to frost action	Suitability for septic tank sites [1]	Suitability as material for—	
					Road subgrade	Road fill
HsB, HsC2, HsC3.	Holston gravelly sandy loam	Not suitable	Slight	Good	Good	Good
HtA, HtB2, HtC2.	Holston silt loam	Not suitable	Moderate	Good	Good	Good
Hu	Huntington fine sandy loam	Not suitable	Moderate	Not suitable	Good	Fair to good
Hv	Huntington gravelly loam	Not suitable	Moderate	Not suitable	Good	Fair to good
Hw	Huntington silt loam	Not suitable	Moderate	Not suitable	Fair	Fair to good
Hx	Huntington silt loam, local alluvium.	Not suitable	Moderate	Fair	Fair	Fair to good
LaA, LaB2, LaC2, LaD2.	Laidig gravelly loam	Not suitable	Moderate	Good	Good	Good
LbD, LbE2	Laidig very stony loam	Not suitable	Moderate	Good	Fair	Fair
LcB2, LcD2	Landisburg cherty silt loam	Not suitable	Strong	Poor	Poor	Poor
Le	Largent silt loam	Not suitable	Strong	Not suitable	Poor [3]	Poor [3]
LgA, LgB2	Leadvale gravelly silt loam	Not suitable	Strong	Poor	Poor	Poor to fair
Lm	Lindside silt loam	Not suitable	Strong	Not suitable	Poor [3]	Poor [3]
Ln	Lindside silt loam, local alluvium.	Not suitable	Strong	Poor	Poor	Poor
LoB2, LoC2, LoC3.	Litz channery loam	Not suitable	Slight to moderate.	Poor	Good	Good
LsB, LsB2, LsC2, LsC3, LsD2, LsD3, LsE2, LsE3, LsF.	Litz shaly loam	Not suitable	Slight to moderate.	Poor	Good	Good
LtB, LtC2, LtC3, LtD2, LtD3, LtE2.	Litz-Teas channery silt loams	Not suitable	Slight to moderate.	Poor	Good	Good
Me	Melvin silt loam	Not suitable	Very strong	Not suitable	Very poor	Very poor
MgB2, MgC2	Monongahela gravelly loam	Not suitable	Strong	Poor	Poor to fair	Fair to good
MhA, MhB2, MhC2, MhD2.	Monongahela silt loam	Not suitable	Strong	Poor	Poor to fair	Fair to good
MmB2, MmC2, MmC3, MmD2, MmD3.	Montevallo shaly loam	Not suitable	Slight to moderate.	Poor	Fair to good	Good
MoA, MoB2, MoC2, MoD2, MoD3, MoE2.	Murrill gravelly loam	Not suitable	Moderate	Good	Good	Good
MrB, MrC2, MrC3, MrD2, MrD3.	Murrill gravelly sandy loam	Not suitable	Slight to moderate.	Good	Good	Good
MsA, MsB2, MsC2.	Murrill silt loam	Not suitable	Moderate	Good	Fair	Good

See footnotes at end of table.

that affect engineering—Continued

Suitability as source of—		Factors that affect engineering practices for—							
		Vertical alinement of highways		Farm ponds					
Topsoil	Sand and gravel	Material	Drainage	Reservoir areas	Embankments	Agricultural drainage	Irrigation [2]	Terraces and diversions	Waterways
Poor	Gravelly substrata.		None	Gravelly substrata.	Sandy	Not needed	No limitation.	Erodible	Erodible.
Fair	Gravelly substrata.		None	Gravelly substrata.		Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.		Flooding	Flood plain	Sandy	Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.		Flooding	Flood plain		Not needed	No limitation.	Erodible	Erodible.
Excellent	Not suitable.		Flooding	Flood plain	High in silt.	Not needed	No limitation.	Erodible	Erodible.
Excellent	Not suitable		None		High in silt.	Not needed	No limitation.	Erodible	Erodible.
Fair	Not suitable.		None		Gravelly	Not needed	No limitation.	Erodible	Erodible.
Fair	Not suitable.	Stones	None	Stones	Stones	Not needed	Stones	Stones	Stones.
Fair	Not suitable.	Fragipan	High water table.	Fragipan	Fragipan	Fragipan	Fragipan	Slow permeability.	Erodible.
Fair	Not suitable.	Poor stability.	High water table	Flood plain	Poor stability.	High water table.	Impeded drainage.	Slow permeability.	Erodible.
Fair	Not suitable.	Fragipan	High water table.	Fragipan	Fragipan	Fragipan	Fragipan	Slow permeability.	Erodible.
Fair to good.	Not suitable.		High water table.	Flood plain	Poor stability.	High water table.	Impeded drainage.	Slow permeability.	Erodible.
Good	Not suitable.		High water table.		Poor stability.	High water table.	Impeded drainage.	Slow permeability.	Erodible.
Fair	Not suitable.	Shallow to bedrock.	None	Channery substrata.	Channery	Not needed	Shallow	Shallow	Shallow; droughty.
Fair	Not suitable.	Shallow to bedrock.	None	Shaly substrata.	Shaly	Not needed	Shallow	Shallow	Shallow; droughty.
Fair	Not suitable.	Shallow to bedrock.	None	Channery substrata.	Channery	Not needed	Shallow	Shallow	Shallow; droughty.
Good	Not suitable.	Very poor stability.	Flooding; high water table.	Flood plain	Very poor stability.	High water table.	Poor drainage.	Slow permeability.	Erodible.
Fair	Gravelly substrata.	Fragipan	High water table.	Fragipan	Fragipan	Fragipan	Fragipan	Very slow permeability.	Erodible.
Fair	Gravelly substrata.	Fragipan	High water table.	Fragipan	Fragipan	Fragipan	Fragipan	Very slow permeability.	Erodible.
Poor	Not suitable.	Shallow to bedrock.	None	Shaly substrata.	Shaly	Not needed	Shallow	Shallow	Shallow; droughty.
Good	Not suitable.		None			Not needed	No limitation.	Erodible	Erodible.
Fair	Not suitable.		None		Sandy	Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.		None			Not needed	No limitation.	Erodible	Erodible.

TABLE 7.—*Soil characteristics*

Map symbol	Soil	Suitability for winter grading	Susceptibility to frost action	Suitability for septic tank sites [1]	Suitability as material for—	
					Road subgrade	Road fill
MvA, MvB2, MvC2, MvD2, MvE2.	Myersville channery loam	Not suitable	Moderate	Good	Fair	Fair to good
MwB3, MwD3	Myersville channery silt loam	Not suitable	Moderate	Good	Fair	Fair to good
MxA, MxB2, MxC2.	Myersville silt loam	Not suitable	Moderate	Good	Fair	Fair to good
MyE2, MyF2	Myersville very stony loam	Not suitable	Moderate	Good	Fair	Fair to good
Pg	Philo gravelly sandy loam	Not suitable	Strong	Not suitable	Poor	Fair
Ph	Philo silt loam	Not suitable	Strong	Not suitable	Poor	Poor
Pn	Pope fine sandy loam	Not suitable	Moderate to strong.	Not suitable	Fair	Fair to good
Po	Pope gravelly loam	Not suitable	Moderate to strong.	Not suitable	Fair	Fair to good
Pp	Pope gravelly sandy loam	Not suitable	Moderate to strong.	Not suitable	Fair	Fair to good
Ps	Pope silt loam	Not suitable	Moderate to strong.	Not suitable	Poor to fair	Fair
Pt	Pope stony gravelly loam	Not suitable	Moderate to strong.	Not suitable	Fair	Fair
Rk	Rocky eroded land	Not suitable	Moderate	Not suitable	Poor	Poor
RoB2	Rohrersville silty clay loam	Not suitable	Very strong	Not suitable	Poor	Poor
Sr	Stony rolling land	Not suitable	Slight to moderate.	Not suitable	Fair	Fair
Ss	Stony steep land	Not suitable	Slight to moderate.	Not suitable	Poor	Poor
TaC2, TaC3, TaD, TaE2.	Talladega gravelly silt loam, thick solum variant.	Not suitable	Moderate	Good	Poor to fair	Fair
Te	Terrace escarpments	Not suitable	Variable	Not suitable	Variable	Variable
ThB2, ThC2	Thurmont gravelly loam	Not suitable	Moderate	Good	Fair to good	Good
TrA, TrC2	Trego gravelly silt loam	Not suitable	Strong	Poor	Poor to fair	Poor to fair
TyB	Tyler silt loam	Not suitable	Very strong	Not suitable	Very poor	Very poor
Wa	Warners loam	Not suitable	Moderate to strong.	Not suitable	Poor	Poor to fair

See footnotes at end of table.

that affect engineering—Continued

Suitability as source of—		Factors that affect engineering practices for—							
Topsoil	Sand and gravel	Vertical alinement of highways		Farm ponds		Agricultural drainage	Irrigation [2]	Terraces and diversions	Waterways
		Material	Drainage	Reservoir areas	Embankments				
Good	Not suitable.	Shallow to bedrock.	None			Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.	Shallow to bedrock.	None			Not needed	Severely eroded.	Erodible	Erodible.
Good	Not suitable.	Shallow to bedrock.	None			Not needed	No limitation.	Erodible	Erodible.
Good	Not suitable.	Shallow to bedrock.	None	Stones	Stones	Not needed	Stones	Stones	Stones.
Poor	Not suitable.		High water table.	Flood plain	Sandy	High water table.	Impeded drainage.	Slow permeability.	Erodible.
Poor	Not suitable.	Poor stability.	High water table.	Flood plain	Poor stability.	High water table.	Impeded drainage.	Slow permeability.	Erodible.
Good	Local gravel substrata.		Flooding	Flood plain	Sandy	Not needed	No limitation.	Erodible	Erodible.
Good	Local gravel substrata.		Flooding	Flood plain		Not needed	No limitation.	Erodible	Erodible.
Fair	Local gravel substrata.		Flooding	Flood plain	Sandy	Not needed	No limitation.	Erodible	Erodible.
Good	Local gravel substrata.		Flooding	Flood plain	High in silt	Not needed	No limitation.	Erodible	Erodible.
Fair	Local gravel substrata.	Stones	Flooding	Stones; flood plain.	Stones	Not needed	Stones	Stones	Stones.
Fair	Not suitable.	Rockiness	None	Rockiness	Rockiness	Not needed		Rockiness	Rockiness.
Good	Not suitable.	Poor stability.	High water table.		Poor stability.	Slow permeability.	Poor drainage.	Erodible	Erodible.
Poor	Not suitable.	Stones, boulders.	None	Stones, boulders.	Stones, boulders.	Not needed		Stones, boulders.	Stones, boulders.
Poor	Not suitable.	Stones, boulders.	None	Stones, boulders.	Stones, boulders.	Not needed		Stones, boulders.	Stones, boulders.
Fair	Not suitable.	Shallow to bedrock.	None	Channery substrata.	Micaceous	Not needed	No limitation.	Erodible	Erodible.
Variable	Variable	Variable	Variable	Variable	Variable	Variable	Variable	Erodible	Erodible.
Good	Local gravel substrata.		None	Gravelly substrata.		Not needed	No limitation.	Erodible	Erodible.
Fair	Local gravel substrata.	Fragipan	High water table.	Fragipan	Fragipan	Fragipan	Fragipan	Erodible	Erodible.
Poor to fair.	Not suitable.	Very poor stability.	High water table.		Very poor stability.	Very slow permeability.	Poor drainage.	Very slow permeability.	Erodible.
Very good.	Not suitable.	Poor stability.	High water table.	Flood plain	Poor stability.	Slow permeability.	Impeded drainage.	Erodible	Erodible.

TABLE 7.—*Soil characteristics*

Map symbol	Soil	Suitability for winter grading	Susceptibility to frost action	Suitability for septic tank sites [1]	Suitability as material for—	
					Road subgrade	Road fill
WbA, WbB2, WbC2, WbC3, WbD2, WbD3, WbE2.	Waynesboro gravelly loam	Not suitable	Moderate	Good	Good	Good
WgB, WgC2, WgC3, WgD2.	Waynesboro gravelly sandy loam.	Not suitable	Slight	Good	Good	Good
Wh	Wehadkee silt loam	Not suitable	Very strong	Not suitable	Poor	Poor
WmB2, WmC2, WmC3, WmD2, WmD3.	Westmoreland channery silt loam.	Not suitable	Moderate	Good	Good	Good

[1] Ratings of fair to good suitability for septic tank sites apply only to soils having slopes no greater than 8 percent. Because of lateral movement of liquid and possible seepage, the soils that have slopes between 8 and 15 percent are less suitable for septic tank sewage disposal, and all soils that have slopes greater than 15 percent are almost entirely unsuitable. Groupings of soils for sewage disposal are discussed in another section of this report.

The crops in each truck-crop group are:

Truck group 1 (very shallow rooted):
- Lettuce
- Onions
- Spinach
- Strawberries

Truck group 2 (shallow rooted):
- Beets
- Broccoli
- Cabbage
- Cauliflower
- Celery
- Cucumbers
- Peas
- Snap beans

Truck group 3 (moderately deep rooted):
- Asparagus
- Eggplant
- Lima beans
- Melons
- Peppers
- Pumpkins
- Squash

Most of the other crops listed need no explanation. "Grass mixture" may be any of several mixtures of grasses, with or without clovers or alfalfa, commonly used for pasture or for hay. Orchards include apples, peaches, cherries, plums, and prunes. Where orchards are indicated with cover, it means that a close-growing crop covers the surface of the soil between orchard trees at the time of irrigation; where orchards are indicated without cover, it means that the soil between the orchard trees is bare, or nearly so, when irrigation water is applied.

Irrigation, to be successful, must meet the needs of the crops and must suit the soils to be irrigated. Different crops will need different amounts of water and at different intervals. Some soils hold much water; some hold little. Water penetrates some soils readily, others much more slowly. Consequently, different kinds of soils should not be irrigated alike. It is for these reasons that table 8 has been arranged to place the better agricultural soils of Washington County in definite irrigation soil groups. The soils within each group can be irrigated alike, and the differences within each group depend mostly on the type of crop to be irrigated.

Irrigation soil group 1 consists of the sandy soils of the county. Because these soils have a relatively high infiltration capacity, water application rates can be fairly high, but they retain less moisture than most of the other soils of the county. On these sandy soils, irrigation systems should be designed for relatively small amounts of water applied frequently.

The soils of irrigation soil group 2 are only moderately well drained. They must be improved by artificial drainage before they are suitable for irrigation. The same is true for some soils in irrigation soil groups 1 and 3. The soils of group 2 have a very slowly permeable, tough or dense hardpan, or a clay subsoil, that limits the depth of effective root development and, thus, limits the effective depth for irrigation. Therefore, available moisture capacities within root zones are lower for soils of group 2 than for better soils.

Irrigation soil group 3 consists of deep, medium-textured soils underlain by sand, silt, and gravel. Water must be applied somewhat slowly here, but the soil can retain larger amounts of water than can the soils of groups 1 and 2.

that affect engineering—Continued

Suitability as source of—		Factors that affect engineering practices for—							
		Vertical alinement of highways		Farm ponds					
Topsoil	Sand and gravel	Material	Drainage	Reservoir areas	Embankments	Agricultural drainage	Irrigation [2]	Terraces and diversions	Waterways
Fair	Gravelly substrata.	----------	None	Gravelly substrata.	----------	Not needed	No limitation.	Erodible	Erodible.
Fair	Gravelly substrata.	----------	None	Gravelly substrata.	Sandy	Not needed	No limitation.	Erodible	Erodible.
Poor to fair.	Local gravel substrata.	Poor stability.	Flooding; high water table.	Flood plain	Poor stability.	High water table.	Poor drainage.	Slow permeability.	Erodible.
Good	Not suitable.	Shallow to bedrock.	None	Shaly to channery substrata.	Shaly or channery.	Not needed	No limitation.	Erodible	Erodible.

[2] Certain characteristics, most notably slope and degree of erosion, affect irrigation, in addition to those indicated in this table. For all practical purposes, only soils of capability classes I, II, and III are considered suitable for irrigation.

[3] Sandy or gravelly layers are suitable for subgrade or fill if artificially drained or if the water table is low.

Irrigation soil group 4 consists of fairly shallow soils over bedrock of somewhat fragmented shale or schist that is generally within about 2 feet of the surface. These soils are highly erodible. Therefore, although the soil over bedrock will retain fairly large amounts of water per unit of depth, the available space for water is limited and application rates must be slow enough to prevent further erosion.

In irrigation soil group 5, which includes a greater number of soils from widespread parts of the county than any other group, the surface layer is medium textured, the subsoil is fairly fine, and the profile is at least moderately deep. These soils can absorb water only rather slowly, but large amounts of water will be retained in the soil and in the subsoil. Irrigation soil group 5 includes the greater part of the better agricultural soils of the county.

Irrigation soil group 6, on the other hand, includes only two soils, both of the Dunmore series. These soils have a friable, silty surface layer, but a very heavy and very fine subsoil. Although this subsoil is not a hardpan, it allows only very slow movement of soil moisture; however, large amounts of moisture can be stored. Application of water must be slow on these soils.

Irrigation soil group 7 consists of the soils of the county that have a fine or very fine surface layer and subsoil, with the subsoil almost invariably somewhat finer than the surface layer. As far as irrigation management is concerned, the soils of group 7 are much like those of group 6. However, because the surface texture is so fine in the soils of irrigation soil group 7, the irrigation of most truck crops is not recommended. Generally, truck crops are much more easily managed on coarse-textured soils, and they are seldom grown on very fine textured soils, except in home gardens.

To summarize, irrigation soil groups 3 and 5 (especially the latter) include most of the better agricultural soils of the county for most purposes. These soils can store rather large amounts of irrigation water, which can be applied at moderate rates, and are thus perhaps the most suitable soils in the county for irrigation farming. Irrigation soil groups 1, 2, 6, and 7 should also give good returns from irrigation.

Irrigation soil group 4 consists of soils that are shallow and generally rather low in natural fertility, or otherwise limited in usefulness. Irrigation on these soils may not be justifiable, except for some special crops or enterprises that will yield high returns per dollar invested. Some good-quality orchard sites, especially with regard to freedom from frost, occur on some of these shallow soils, and it may be feasible to irrigate orchards on such sites.

Soil groups for sewage disposal

Although Washington County is mostly rural, its county seat, Hagerstown, is a growing industrial city. Along with its industrial growth there is rapid residential expansion in some of its suburban areas. There are also growing communities in the county; Smithburg is one example.

In any rapid industrial or residential expansion, one of the problems is disposal of sewage. Wherever complete systems of sewers can be installed, the problems are not left to the individual landowner. Unless a sewerage system can be built, however, the individual builder or landowner generally needs to arrange for disposal of sewage, and, as a rule, he will install a septic tank.

TABLE 8.—*Irrigation soil groups, with adapted crops and certain water relationships*[1]

Irrigation soil group and names of soils in each group	Maximum rate of application on flatland[2]	Crops locally adapted for irrigation	Average depth of soil to be irrigated	Average available moisture capacity to depth indicated[3]
	Inches per hour		*Inches*	*Inches*
Irrigation soil group 1: Moderately well drained and well drained sandy loams—	0. 5	Truck group 1	12	1. 7
Ashton fine sandy loam, 0 to 5 percent slopes.	. 5	Truck group 2	13	2. 2
Calvin channery fine sandy loam, 3 to 10 percent slopes, moderately eroded.	. 5	Truck group 3	18	2. 7
Chewacla gravelly sandy loam.[4]	. 5	Corn	24	3. 7
Holston gravelly sandy loam, 3 to 8 percent slopes.	1. 0	Sweet corn	18	2. 7
Holston gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.	1. 0	Alfalfa	27	4. 2
Huntington fine sandy loam.	1. 0	Ladino clover	18	2. 7
Murrill gravelly sandy loam, 0 to 8 percent slopes.	. 5	Grass mixture	18	2. 7
Murrill gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.	. 5	Irish potatoes	18	2. 7
Philo gravelly sandy loam.[4]	. 5	Tomatoes	24	3. 7
Pope fine sandy loam.	1. 0	Brambles	24	3. 7
Pope gravelly sandy loam.	. 5	Orchards (with cover)	27	4. 2
Waynesboro gravelly sandy loam, 0 to 8 percent slopes.		Orchards (without cover)	27	4. 2
Waynesboro gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.				
Irrigation soil group 2:[5] Moderately well drained loams and silt loams with a tough, dense, or compact subsoil within about 20 inches of the surface—	. 3	Truck group 1	12	2. 0
Buchanan gravelly loam, 0 to 3 percent slopes.	. 3	Truck group 2	15	2. 5
Buchanan gravelly loam, 3 to 8 percent slopes, moderately eroded.	. 3	Truck group 3	18	3. 0
Buchanan gravelly loam, 8 to 15 percent slopes, moderately eroded.	. 3	Corn	20	3. 4
Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded.	. 5	Sweet corn	20	3. 4
Landisburg cherty silt loam, 8 to 25 percent slopes, moderately eroded.	. 5	Ladino clover	18	3. 0
Leadvale gravelly silt loam, 0 to 3 percent slopes.	. 3	Grass mixture	18	3. 0
Leadvale gravelly silt loam, 3 to 8 percent slopes, moderately eroded.		Tomatoes	20	3. 4
Monongahela gravelly loam, 3 to 8 percent slopes, moderately eroded.				
Monongahela gravelly loam, 8 to 15 percent slopes, moderately eroded.				
Monongahela silt loam, 0 to 3 percent slopes.				
Monongahela silt loam, 3 to 8 percent slopes, moderately eroded.				
Monongahela silt loam, 8 to 15 percent slopes, moderately eroded.				
Trego gravelly silt loam, 0 to 3 percent slopes.				
Trego gravelly silt loam, 3 to 15 percent slopes, moderately eroded.				
Irrigation soil group 3: Moderately well drained and well drained, deep loams and silt loams over unconsolidated sand, silt, and gravel substratum—	. 5	Truck group 1	12	2. 0
Chewacla silt loam.[4]	. 5	Truck group 2	15	2. 5
Congaree silt loam and gravelly loam.	. 5	Truck group 3	18	3. 0
Huntington gravelly loam.	. 5	Corn	24	4. 0
Huntington silt loam.	. 8	Sweet corn	18	3. 0
Huntington silt loam, local alluvium.	. 8	Alfalfa	27	4. 5
Largent silt loam.[4]	. 8	Ladino clover	18	3. 0
Lindside silt loam.[4]	. 5	Grass mixture	18	3. 0
Lindside silt loam, local alluvium.[4]	. 5	Irish potatoes	24	4. 0
Philo silt loam.[4]	. 5	Tomatoes	24	4. 0
Pope gravelly loam.	. 8	Brambles	24	4. 0
Pope silt loam.	. 5	Orchards (with cover)	27	4. 5
Warners loam, 0 to 8 percent slopes.[4]		Orchards (without cover)	27	4. 5
Irrigation soil group 4: Well-drained to excessively drained, medium-textured soils over fragmented bedrock at a depth of 18 to 24 inches—	. 3	Truck group 1	12	2. 0
Berks channery loam, ridges, 0 to 10 percent slopes, moderately eroded.	. 3	Truck group 2	15	2. 5
Berks channery loam, ridges, 10 to 20 percent slopes, moderately eroded.	. 3	Truck group 3	18	3. 0
Berks shaly silt loam, 0 to 8 percent slopes.	. 3	Corn	24	4. 0
	. 6	Sweet corn	18	3. 0
	. 6	Alfalfa	24	4. 0
		Ladino clover	18	3. 0

See footnotes at end of table.

TABLE 8.—*Irrigation soil groups, with adapted crops and certain water relationships*[1]—Continued

Irrigation soil group and names of soils in each group	Maximum rate of application on flatland [2]	Crops locally adapted for irrigation	Average depth of soil to be irrigated	Average available moisture capacity to depth indicated [3]
	Inches per hour		*Inches*	*Inches*
Irrigation soil group 4—Continued				
Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded.	0.6	Grass mixture	18	3.0
Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded.	.3	Tomatoes	24	4.0
Berks silt loam, ridges, 0 to 10 percent slopes, moderately eroded.	.3	Brambles	24	4.0
Berks silt loam, ridges, 10 to 20 percent slopes, moderately eroded.	.6	Orchards (with cover)	24	4.0
Calvin channery loam, 3 to 10 percent slopes, moderately eroded.	.3	Orchards (without cover)	24	4.0
Calvin channery loam, 10 to 20 percent slopes, moderately eroded				
Calvin shaly loam, 0 to 10 percent slopes, moderately eroded.				
Calvin shaly loam, 10 to 20 percent slopes, moderately eroded.				
Calvin-Berks channery loams, 0 to 10 percent slopes, moderately eroded.				
Calvin-Berks channery loams, 10 to 20 percent slopes, moderately eroded.				
Calvin-Montevallo shaly loams, 0 to 10 percent slopes, moderately eroded.				
Calvin-Montevallo shaly loams, 10 to 20 percent slopes, moderately eroded.				
Chandler silt loam and channery silt loam, 0 to 10 percent slopes.				
Chandler silt loam and channery silt loam, 3 to 10 percent slopes, moderately eroded.				
Hazel channery silt loam, 0 to 10 percent slopes, moderately eroded.[6]				
Litz channery loam, 3 to 10 percent slopes, moderately eroded.				
Litz channery loam, 10 to 20 percent slopes, moderately eroded.				
Litz shaly loam, 0 to 10 percent slopes.				
Litz shaly loam, 3 to 10 percent slopes, moderately eroded.				
Litz shaly loam, 10 to 20 percent slopes, moderately eroded.				
Litz-Teas channery silt loams, 0 to 8 percent slopes.				
Litz-Teas channery silt loams, 8 to 15 percent slopes, severely eroded.				
Montevallo shaly loam, 0 to 10 percent slopes, moderately eroded.				
Talladega gravelly silt loam, thick solum variant, 0 to 20 percent slopes, moderately eroded.				
Irrigation soil group 5: Well-drained loams and silt loams with moderately fine subsoil underlain by bedrock or unconsolidated material—	.4	Truck group 1	12	2.0
Braddock and Thurmont gravelly loams, 3 to 8 percent slopes, moderately eroded.	.4	Truck group 2	15	2.5
Braddock and Thurmont gravelly loams, 8 to 15 percent slopes, moderately eroded.	.4	Truck group 3	18	3.0
Duffield silt loam, 0 to 3 percent slopes.	.4	Corn	24	4.0
Duffield silt loam, 3 to 8 percent slopes, moderately eroded.	.4	Sweet corn	18	3.0
Duffield silt loam, 8 to 15 percent slopes, moderately eroded.	.7	Alfalfa	27	4.5
Edgemont and Laidig channery loams, 0 to 12 percent slopes.	.7	Ladino clover	18	3.0
Edgemont and Laidig channery loams, 5 to 20 percent slopes, moderately eroded.	.7	Grass mixture	18	3.0
Elliber cherty loam, 5 to 12 percent slopes, moderately eroded.	.4	Irish potatoes	24	4.0
Elliber cherty loam, 12 to 25 percent slopes, moderately eroded.	.4	Tomatoes	24	4.0
Etowah gravelly loam, 0 to 3 percent slopes.	.4	Brambles	24	4.0
Etowah gravelly loam, 3 to 8 percent slopes, moderately eroded.	.7	Orchards (with cover)	27	4.5
Etowah gravelly loam, 8 to 15 percent slopes, moderately eroded.	.4	Orchards (without cover)	27	4.5
Etowah silt loam, 0 to 3 percent slopes.				
Etowah silt loam, 3 to 8 percent slopes, moderately eroded.				
Etowah silt loam, 8 to 15 percent slopes, moderately eroded.				
Fauquier channery loam, 0 to 5 percent slopes.				
Fauquier channery loam, 5 to 10 percent slopes, moderately eroded.				
Fauquier channery loam, 10 to 20 percent slopes, moderately eroded.				
Fauquier silt loam, 0 to 3 percent slopes.				
Fauquier silt loam, 3 to 10 percent slopes, moderately eroded.				
Fauquier silt loam, 10 to 20 percent slopes, moderately eroded.				
Frankstown and Duffield channery silt loams, 0 to 3 percent slopes.				
Frankstown and Duffield channery silt loams, 3 to 8 percent slopes, moderately eroded.				

See footnotes at end of table.

TABLE 8.—*Irrigation soil groups with adapted crops and certain water relationships* [1]—Continued

Irrigation soil group and names of soils in each group	Maximum rate of application on flatland [2]	Crops locally adapted for irrigation	Average depth of soil to be irrigated	Average available moisture capacity to depth indicated [3]
	Inches per hour		*Inches*	*Inches*
Irrigation soil group 5—Continued				
Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, moderately eroded.				
Frederick cherty silt loam, 0 to 8 percent slopes, moderately eroded.				
Frederick cherty silt loam, 8 to 15 percent slopes, moderately eroded.				
Hagerstown silt loam, 0 to 3 percent slopes.				
Hagerstown silt loam, 0 to 8 percent slopes, moderately eroded.				
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded.				
Highfield gravelly loam, 0 to 5 percent slopes.				
Highfield gravelly loam, 5 to 10 percent slopes, moderately eroded.				
Highfield gravelly loam, 10 to 20 percent slopes, moderately eroded.				
Holston gravelly loam, 0 to 3 percent slopes.				
Holston gravelly loam, 0 to 8 percent slopes, moderately eroded.				
Holston gravelly loam, 8 to 15 percent slopes, moderately eroded.				
Holston silt loam, 0 to 3 percent slopes.				
Holston silt loam, 3 to 8 percent slopes, moderately eroded.				
Holston silt loam, 8 to 15 percent slopes, moderately eroded.				
Laidig gravelly loam, 0 to 3 percent slopes.				
Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded.				
Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded.				
Murrill gravelly loam, 0 to 3 percent slopes.				
Murrill gravelly loam, 0 to 8 percent slopes, moderately eroded.				
Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded.				
Murrill silt loam, 0 to 3 percent slopes.				
Murrill silt loam, 0 to 8 percent slopes, moderately eroded.				
Murrill silt loam, 8 to 15 percent slopes, moderately eroded.				
Myersville channery loam, 0 to 3 percent slopes.				
Myersville channery loam, 3 to 10 percent slopes, moderately eroded.				
Myersville channery loam, 10 to 20 percent slopes, moderately eroded.				
Myersville silt loam, 0 to 3 percent slopes.				
Myersville silt loam, 3 to 10 percent slopes, moderately eroded.				
Myersville silt loam, 10 to 20 percent slopes, moderately eroded.				
Thurmont gravelly loam, 3 to 8 percent slopes, moderately eroded.				
Thurmont gravelly loam, 8 to 15 percent slopes, moderately eroded.				
Waynesboro gravelly loam, 0 to 3 percent slopes.				
Waynesboro gravelly loam, 0 to 8 percent slopes, moderately eroded.				
Waynesboro gravelly loam, 8 to 15 percent slopes, moderately eroded.				
Westmoreland channery silt loam, 3 to 10 percent slopes, moderately eroded.				
Westmoreland channery silt loam, 10 to 20 percent slopes, moderately eroded.				
Irrigation soil group 6: Well-drained silt loams with a thick, very fine-textured subsoil underlain by bedrock—	0.3	Truck group 1	12	2.0
	.3	Truck group 2	15	2.5
	.3	Truck group 3	18	3.0
	.3	Corn	24	4.0
	.3	Sweet corn	18	3.0
	.5	Alfalfa	27	4.5
	.5	Ladino clover	18	3.0
	.5	Grass mixture	18	3.0
	.3	Irish potatoes	18	3.0
	.3	Tomatoes	24	4.0
	.3	Brambles	24	4.0
	.5	Orchards (with cover)	27	4.5
	.3	Orchards (without cover)	27	4.5
Dunmore cherty silt loam, 3 to 8 percent slopes, moderately eroded				
Dunmore cherty silt loam, 8 to 15 percent slopes, moderately eroded				

See footnotes at end of table.

TABLE 8.—*Irrigation soil groups, with adapted crops and certain water relationships*[1]—Continued

Irrigation soil group and names of soils in each group	Maximum rate of application on flatland [2]	Crops locally adapted for irrigation	Average depth of soil to be irrigated	Average available moisture capacity to depth indicated [3]
	Inches per hour		*Inches*	*Inches*
Irrigation soil group 7: Well-drained silty clay loams and clay loams with a fine to very fine-textured subsoil underlain by bedrock—	0. 3	Corn	24	4. 0
Benevola clay loam, 0 to 3 percent slopes	. 3	Sweet corn	18	3. 0
Benevola clay loam, 3 to 8 percent slopes, moderately eroded.	. 5	Alfalfa	27	4. 5
Benevola clay loam, 8 to 15 percent slopes, moderately eroded.	. 5	Ladino clover	18	3. 0
Corydon clay loam, 0 to 3 percent slopes.	. 5	Grass mixture	18	3. 0
Corydon clay loam, 3 to 8 percent slopes, moderately eroded.	. 3	Irish potatoes	18	3. 0
Corydon clay loam, 8 to 15 percent slopes, moderately eroded.	. 3	Tomatoes	24	4. 0
Hagerstown clay loam, 0 to 3 percent slopes.	. 3	Brambles	24	4. 0
Hagerstown clay loam, 0 to 8 percent slopes, moderately eroded.	. 5	Orchards (with cover)	27	4. 5
Hagerstown clay loam, 8 to 15 percent slopes, moderately eroded.	. 3	Orchards (without cover)	27	4. 5
Hagerstown silty clay loam, 0 to 3 percent slopes.				
Hagerstown silty clay loam, 0 to 8 percent slopes, moderately eroded.				
Hagerstown silty clay loam, 8 to 15 percent slopes, moderately eroded.				

[1] Only the best croplands of Washington County, moderately well drained or better, and suitable for more or less continuous cultivation (capability classes I, II, and III) are listed in this table. No severely eroded soils are listed.

[2] Maximum rates of water application do not apply, except under ideal conditions on flatlands. The application must be reduced to suit specific site conditions based on soil structure, slope, erosion, cropping system, past history of the area to be irrigated, and othe factors.

[3] The figures for available moisture capacities are strictly estimates, and these are intended to be averages for all soils of the group. There are some variations between soils within a group, particularly between those of different structure or different slope and degrees of erosion.

[4] These soils are only moderately well drained at best. Adequate artificial drainage practices must be applied, in most instances, to make these soils suitable for irrigation. These soils are not considered suitable for alfalfa, Irish potatoes, brambles, or orchards.

[5] All soils of this group will need adequate artificial drainage to make them suitable for irrigation. They are not considered suitable for alfalfa, Irish potatoes, brambles, or orchards.

[6] The Hazel channery silt loam is seldom much more than 12 inches deep over bedrock. If irrigation is to be used on this soil, no more water should be applied than can be stored within this 12-inch surface layer.

Many individual householders, particularly in suburbs of great cities, have built septic tank systems that later failed. Most of the failures occurred during wet seasons. Some of them occurred after an initial period during which the system appeared to function properly. Investigations have disclosed that many, if not nearly all, of these failures occurred in soils that are not well drained or that contain a dense or fine-textured subsoil. In such a soil the movement of effluent liquid from a septic tank is slow. In wet weather and for a long time after wet weather, the soil is saturated, the water table stands near the surface, and there is no available space for the effluent. Many a householder has discovered, to his dismay, that a septic tank installed during dry weather failed to function after any considerable period of rain.

Other failures have occurred where the soil is steep (generally more than 8 percent slope), shallow to bedrock or to a dense substratum, or subject to seasonal flooding by overflowing streams. Such failures have been fewer, however, than those resulting from a water table or a slowly permeable soil because they have been more readily foreseen.

Soil scientists, health officers, and others have worked together to find out the significance of soil characteristics that can be observed before a septic tank is installed. The factors that limit and those that favor the functioning of septic tanks have been used to characterize, at least in part, the soils of Washington County. Experience has shown that modern soil survey maps, the kind published with this report, can be used to predict the behavior of a septic tank system with a high degree of accuracy. It is always necessary, however, to examine the soil at the exact site. A small, included area of an unfavorable soil, too small to be shown on the map, might be there.

The general suitabilities of soils for septic tank sites are indicated in column 5 of table 7. However, it is explained in a footnote to table 7 that ratings of fair or good, as given in the table, should apply only to the areas of slopes of not more than 8 percent. These ratings are recorded alphabetically by soil series in table 7; hence, no particular classification or grouping is apparent there.

The soils of Washington County have also been grouped as to their suitability for sewage disposal. Eight groups have been made for this purpose.

SOIL GROUP 1 FOR SEWAGE DISPOSAL

The soils of group 1 for sewage disposal have few, if any, limitations for this use. They are deep, well-drained soils over a friable substratum that consists of deeply weathered rock or other unconsolidated materials. There is no hindrance to the movement of water or of effluent, normally, to a depth of at least 6 feet. There are few, if any, failures of individual tanks on these soils. Some of the soils have a rather fine-textured subsoil that is somewhat limited in permeability.

Although there should be no difficulty with an individual, family-size septic tank, it is possible that difficulty might develop if a number of tanks were concentrated in a small area. This might occur where lots are small, as in a closely spaced residential development. The soils in this group that might develop difficulties under such conditions are those of the Benevola, Etowah, and Hagerstown series, and perhaps some areas of soils of the Duffield, Frankstown, and Murrill series. It should also be pointed out that occasional ledges of limestone may be encountered in some of the soils in group 1. Ledges will help determine the exact location of an individual septic tank.

The soils in group 1 for sewage disposal are given in the following list. A few of the soils have slopes greater than 8 percent, but their characteristics fit better with soils of this group than with any other.

Benevola clay loam, 0 to 3 percent slopes.
Benevola clay loam, 3 to 8 percent slopes, moderately eroded.
Braddock and Thurmont gravelly loams, 3 to 8 percent slopes, moderately eroded.
Duffield silt loam, 0 to 3 percent slopes.
Duffield silt loam, 3 to 8 percent slopes, moderately eroded.
Edgemont and Laidig channery loams, 0 to 12 percent slopes.
Edgemont and Laidig very stony loams, 0 to 5 percent slopes.
Etowah gravelly loam, 0 to 3 percent slopes.
Etowah gravelly loam, 3 to 8 percent slopes, moderately eroded.
Etowah silt loam, 0 to 3 percent slopes.
Etowah silt loam, 3 to 8 percent slopes, moderately eroded.
Fauquier channery loam, 0 to 5 percent slopes.
Fauquier channery loam, 5 to 10 percent slopes, moderately eroded.
Fauquier silt loam, 0 to 3 percent slopes.
Fauquier silt loam, 3 to 10 percent slopes, moderately eroded.
Frankstown and Duffield channery silt loams, 0 to 3 percent slopes.
Frankstown and Duffield channery silt loams, 3 to 8 percent slopes, moderately eroded.
Frankstown and Duffield channery silt loams, 0 to 8 percent slopes, severely eroded.
Frederick cherty silt loam, 0 to 8 percent slopes, moderately eroded.
Hagerstown clay loam, 0 to 3 percent slopes.
Hagerstown clay loam, 0 to 8 percent slopes, moderately eroded.
Hagerstown clay loam, 3 to 8 percent slopes, severely eroded.
Hagerstown silt loam, 0 to 3 percent slopes.
Hagerstown silt loam, 0 to 8 percent slopes, moderately eroded.
Hagerstown silty clay loam, 0 to 3 percent slopes.
Hagerstown silty clay loam, 0 to 8 percent slopes, moderately eroded.
Hagerstown, Corydon, and Duffield very rocky silt loams, 0 to 3 percent slopes.
Highfield gravelly loam, 0 to 5 percent slopes.
Highfield gravelly loam, 5 to 10 percent slopes, moderately eroded.
Highfield very stony loam, 0 to 5 percent slopes.
Holston gravelly loam, 0 to 3 percent slopes.
Holston gravelly loam, 0 to 8 percent slopes, moderately eroded.
Holston gravelly sandy loam, 3 to 8 percent slopes.
Holston gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.
Holston silt loam, 0 to 3 percent slopes.
Holston silt loam, 3 to 8 percent slopes, moderately eroded.
Laidig gravelly loam, 0 to 3 percent slopes.
Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded.
Murrill gravelly loam, 0 to 3 percent slopes.
Murrill gravelly loam, 0 to 8 percent slopes, moderately eroded.
Murrill gravelly sandy loam, 0 to 8 percent slopes.
Murrill gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.
Murrill silt loam, 0 to 3 percent slopes.
Murrill silt loam, 0 to 8 percent slopes, moderately eroded.
Myersville channery loam, 0 to 3 percent slopes.
Myersville channery loam, 3 to 10 percent slopes, moderately eroded.
Myersville channery silt loam, 3 to 10 percent slopes, severely eroded.
Myersville silt loam, 0 to 3 percent slopes.
Myersville silt loam, 3 to 10 percent slopes, moderately eroded.
Thurmont gravelly loam, 3 to 8 percent slopes, moderately eroded.
Waynesboro gravelly loam, 0 to 3 percent slopes.
Waynesboro gravelly loam, 0 to 8 percent slopes, moderately eroded.
Waynesboro gravelly sandy loam, 0 to 8 percent slopes.
Waynesboro gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.
Westmoreland channery silt loam, 3 to 10 percent slopes, moderately eroded.

SOIL GROUP 2 FOR SEWAGE DISPOSAL

The soils of group 2 for sewage disposal have the same general characteristics as those of group 1, except that the slopes of nearly all of them are between 8 and 15 percent. The steeper soils are less desirable for sewage disposal fields than those of group 1. There is greater danger of downslope pollution, and the slope increases the costs of excavating and grading. The soils of the Benevola, Duffield, Etowah, Frankstown, Hagerstown, and Murrill series are somewhat less favorable than the other soils of the group. In spite of these limitations, the soils of group 2 for sewage disposal are rated as fairly suitable for this purpose.

Some of the soils in group 2 have a range of slope less than 8 percent or greater than 15 percent, but their characteristics fit better with soils of this group than with any other.

Benevola clay loam, 8 to 15 percent slopes, moderately eroded.
Benevola clay loam, 8 to 15 percent slopes, severely eroded.
Braddock and Thurmont gravelly loams, 8 to 15 percent slopes, moderately eroded.
Duffield extremely rocky silt loam, 0 to 15 percent slopes.
Duffield silt loam, 8 to 15 percent slopes, moderately eroded.
Duffield silt loam, 8 to 25 percent slopes, severely eroded.
Duffield very rocky silt loam, 3 to 15 percent slopes.
Edgemont and Laidig channery loams, 5 to 20 percent slopes, moderately eroded.
Elliber cherty loam, 5 to 12 percent slopes, moderately eroded.
Etowah gravelly loam, 8 to 15 percent slopes, moderately eroded.
Etowah silt loam, 8 to 15 percent slopes, moderately eroded.
Fauquier channery loam, 10 to 20 percent slopes, moderately eroded.
Fauquier silt loam, 10 to 20 percent slopes, moderately eroded.
Frankstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded.
Frankstown very rocky silt loam, 8 to 15 percent slopes, severely eroded.
Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, moderately eroded.
Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, severely eroded.
Frederick cherty silt loam, 8 to 15 percent slopes, moderately eroded.
Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded.
Hagerstown clay loam, 8 to 15 percent slopes, moderately eroded.
Hagerstown clay loam, 8 to 15 percent slopes, severely eroded.
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded.
Hagerstown silty clay loam, 8 to 15 percent slopes, moderately eroded.
Hagerstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded.
Hagerstown very rocky silty clay loam, 3 to 15 percent slopes, moderately eroded.
Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded.
Highfield gravelly loam, 10 to 20 percent slopes, moderately eroded.
Holston gravelly loam, 8 to 15 percent slopes, moderately eroded.
Holston gravelly sandy loam, 8 to 15 percent slopes, severely eroded.

Holston silt loam, 8 to 15 percent slopes, moderately eroded.
Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded.
Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded.
Murrill gravelly sandy loam, 8 to 15 percent slopes, severely eroded.
Murrill silt loam, 8 to 15 percent slopes, moderately eroded.
Myersville channery loam, 10 to 20 percent slopes, moderately eroded.
Myersville silt loam, 10 to 20 percent slopes, moderately eroded.
Talladega gravelly silt loam, thick solum variant, 0 to 20 percent slopes, moderately eroded.
Thurmont gravelly loam, 8 to 15 percent slopes, moderately eroded.
Waynesboro gravelly loam, 8 to 15 percent slopes, moderately eroded.
Waynesboro gravelly loam, 3 to 15 percent slopes, severely eroded.
Waynesboro gravelly sandy loam, 8 to 15 percent slopes, severely eroded.
Westmoreland channery silt loam, 10 to 20 percent slopes, moderately eroded.
Westmoreland channery silt loam, 3 to 20 percent slopes, severely eroded.

SOIL GROUP 3 FOR SEWAGE DISPOSAL

The soils of group 3 for sewage disposal are of poor to very poor suitability for this purpose because they are too steep. In some selected spots, if a very large area is available for dispersal, some successful disposal units might be established. In general, however, the soils of this group should be avoided in selecting sites for septic tanks.

Most of the soils in group 3 have slopes greater than 15 percent. Several of the mapping units include some soils having gentler slopes, but they are so stony or severely eroded that they fit with the steeper soils in their suitability for sewage disposal.

Braddock and Thurmont gravelly loams, 15 to 25 percent slopes.
Dekalb and Leetonia very stony sandy loams, 0 to 25 percent slopes.
Dekalb and Leetonia very stony sandy loams, 25 to 45 percent slopes.
Dekalb and Leetonia very stony sandy loams, 45 to 60 percent slopes.
Dekalb and Lehew very stony loams, 0 to 25 percent slopes.
Dekalb and Lehew very stony loams, 25 to 45 percent slopes.
Duffield silt loam, 15 to 25 percent slopes, moderately eroded.
Duffield very rocky silt loam, 8 to 45 percent slopes, moderately eroded.
Edgemont and Laidig channery loams, 20 to 35 percent slopes, moderately eroded.
Edgemont and Laidig channery loams, 35 to 60 percent slopes, moderately eroded.
Frankstown extremely rocky silt loam, 0 to 25 percent slopes.
Frankstown extremely rocky silt loam, 25 to 45 percent slopes.
Frankstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded.
Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, moderately eroded.
Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, severely eroded.
Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, moderately eroded.
Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, severely eroded.
Frederick cherty silt loam, 15 to 25 percent slopes, moderately eroded.
Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded.
Frederick cherty silt loam, 25 to 45 percent slopes, moderately eroded.
Hagerstown clay loam, 15 to 25 percent slopes, moderately eroded.
Hagerstown clay loam, 15 to 25 percent slopes, severely eroded.
Hagerstown extremely rocky silt loam, 0 to 25 percent slopes, moderately eroded.
Hagerstown extremely rocky silty clay loam, 0 to 25 percent slopes, moderately eroded.
Hagerstown extremely rocky soils, 25 to 45 percent slopes.
Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded.
Hagerstown silty clay loam, 15 to 25 percent slopes, moderately eroded.
Hagerstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded.
Hagerstown very rocky silty clay loam, 15 to 45 percent slopes, moderately eroded.
Hagerstown very rocky soils, 45 to 55 percent slopes.
Hagerstown and Duffield silt loams, 25 to 45 percent slopes, moderately eroded.
Highfield gravelly loam, 20 to 35 percent slopes, moderately eroded.
Highfield very stony loam, 5 to 30 percent slopes.
Highfield very stony loam, 30 to 45 percent slopes.
Holston gravelly loam, 8 to 25 percent slopes, severely eroded.
Holston gravelly loam, 15 to 25 percent slopes, moderately eroded.
Holston gravelly loam, 25 to 45 percent slopes, moderately eroded.
Laidig gravelly loam, 15 to 25 percent slopes, moderately eroded.
Laidig very stony loam, 8 to 25 percent slopes.
Laidig very stony loam, 15 to 45 percent slopes, moderately eroded.
Murrill gravelly loam, 15 to 25 percent slopes, moderately eroded.
Murrill gravelly loam, 25 to 45 percent slopes, moderately eroded.
Murrill gravelly loam, 8 to 25 percent slopes, severely eroded.
Murrill gravelly sandy loam, 15 to 25 percent slopes, moderately eroded.
Murrill gravelly sandy loam, 15 to 25 percent slopes, severely eroded.
Myersville channery loam, 20 to 30 percent slopes, moderately eroded.
Myersville channery loam, 30 to 45 percent slopes, moderately eroded.
Myersville channery silt loam, 10 to 30 percent slopes, severely eroded.
Myersville very stony loam, 3 to 30 percent slopes, moderately eroded.
Myersville very stony loam, 30 to 55 percent slopes, eroded.
Rocky eroded land.
Stony rolling land.
Stony steep land.
Talladega gravelly silt loam, thick solum variant, 10 to 20 percent slopes, severely eroded.
Talladega gravelly silt loam, thick solum variant, 20 to 30 percent slopes.
Talladega gravelly silt loam, thick solum variant, 20 to 45 percent slopes, moderately eroded.
Waynesboro gravelly loam, 15 to 25 percent slopes, moderately eroded.
Waynesboro gravelly loam, 15 to 25 percent slopes, severely eroded.
Waynesboro gravelly loam, 25 to 45 percent slopes, moderately eroded.
Waynesboro gravelly sandy loam, 15 to 25 percent slopes, moderately eroded.
Westmoreland channery silt loam, 20 to 30 percent slopes, moderately eroded.
Westmoreland channery silt loam, 20 to 30 percent slopes, severely eroded.

SOIL GROUP 4 FOR SEWAGE DISPOSAL

Soil group 4 for sewage disposal consists of shallow to moderately deep soils of the uplands; slopes are no greater than 8 to 10 percent. The soils are underlain by bedrock or by slowly permeable clay, generally within 3 feet of the surface. They are not subject to flooding.

Soils of group 4 are intermediate in their suitability for sewage disposal; they can be rated as fair, although some spots are poor. These soils are well drained, and most of them are readily permeable, but they are underlain by bedrock or by heavy clay at a shallow or moderate depth. There is not enough space between the surface and the bedrock or other dense substratum for a large amount of effluent. Some successful disposal units can be established on these soils, but the fields, in general, have to

be much larger than on the more suitable soils of sewage disposal soil group 1. Examination of the particular site is especially needed. There is danger of oversaturation of the soil with sewage, and thus considerable danger of pollution of other soil areas and of water supplies. The Corydon and Dunmore soils are somewhat less permeable than the other soils of this group.

Berks channery loam, ridges, 0 to 10 percent slopes, moderately eroded.
Berks shaly silt loam, 0 to 8 percent slopes.
Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded.
Berks silt loam, ridges, 0 to 10 percent slopes, moderately eroded.
Calvin channery fine sandy loam, 3 to 10 percent slopes, moderately eroded.
Calvin channery loam, 3 to 10 percent slopes, moderately eroded.
Calvin shaly loam, 0 to 10 percent slopes, moderately eroded.
Calvin-Berks channery loams, 0 to 10 percent slopes, moderately eroded.
Calvin-Montevallo shaly loams, 0 to 10 percent slopes, moderately eroded.
Chandler silt loam and channery silt loam, 0 to 10 percent slopes.
Chandler silt loam and channery silt loam, 3 to 10 percent slopes, moderately eroded.
Corydon clay loam, 0 to 3 percent slopes.
Corydon clay loam, 3 to 8 percent slopes, moderately eroded.
Dunmore cherty silt loam, 3 to 8 percent slopes, moderately eroded.
Litz channery loam, 3 to 10 percent slopes, moderately eroded.
Litz shaly loam, 0 to 10 percent slopes.
Litz shaly loam, 3 to 10 percent slopes, moderately eroded.
Litz-Teas channery silt loams, 0 to 8 percent slopes.
Montevallo shaly loam, 0 to 10 percent slopes, moderately eroded.

SOIL GROUP 5 FOR SEWAGE DISPOSAL

Soil group 5 for sewage disposal consists of soils that are like those of group 4, except in slope. Their slopes generally range from 8 to 20 percent.

Soils of group 5 are very poor for sewage disposal. Lateral movement of effluent is likely to be rapid. Thus, active organisms of the sewage can easily reach the surface by seepage and cause serious risk of pollution.

Berks channery loam, ridges, 10 to 20 percent slopes, moderately eroded.
Berks channery loam, ridges, 10 to 20 percent slopes, severely eroded.
Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded.
Berks silt loam, ridges, 10 to 20 percent slopes, moderately eroded.
Berks silt loam, ridges, 10 to 20 percent slopes, severely eroded.
Calvin channery loam, 10 to 20 percent slopes, moderately eroded.
Calvin shaly loam, 10 to 20 percent slopes, moderately eroded.
Calvin shaly loam, 10 to 20 percent slopes, severely eroded.
Calvin-Berks channery loams, 10 to 20 percent slopes, moderately eroded.
Calvin-Berks channery loams, 3 to 20 percent slopes, severely eroded.
Calvin-Montevallo shaly loams, 10 to 20 percent slopes, moderately eroded.
Chandler silt loam and channery silt loam, 10 to 20 percent slopes, moderately eroded.
Corydon clay loam, 8 to 15 percent slopes, moderately eroded.
Corydon extremely rocky clay loam, 0 to 15 percent slopes.
Dunmore cherty silt loam, 8 to 15 percent slopes, moderately eroded.
Fauquier silt loam, shallow, 3 to 20 percent slopes, moderately eroded.
Hazel channery silt loam, 0 to 10 percent slopes, moderately eroded.
Litz channery loam, 10 to 20 percent slopes, moderately eroded.
Litz channery loam, 10 to 20 percent slopes, severely eroded.
Litz shaly loam, 10 to 20 percent slopes, moderately eroded.
Litz shaly loam, 10 to 20 percent slopes, severely eroded.
Litz-Teas channery silt loams, 3 to 15 percent slopes, moderately eroded.
Litz-Teas channery silt loams, 8 to 15 percent slopes, severely eroded.
Montevallo shaly loam, 10 to 20 percent slopes, moderately eroded.

SOIL GROUP 6 FOR SEWAGE DISPOSAL

Soil group 6 for sewage disposal consists of soils similar to those in groups 4 and 5, but the soils are so steep or so shallow as a result of erosion that they are almost entirely unsuitable for sewage disposal. Most of the slopes are greater than 15 percent.

Berks channery loam, ridges, 20 to 30 percent slopes, moderately eroded.
Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded.
Berks silt loam, ridges, 20 to 30 percent slopes, moderately eroded.
Berks soils, ridges, 20 to 45 percent slopes, severely eroded.
Berks soils, ridges, 30 to 60 percent slopes.
Calvin channery loam, 20 to 30 percent slopes.
Calvin channery loam, 20 to 30 percent slopes, moderately eroded.
Calvin channery loam, 30 to 45 percent slopes.
Calvin channery loam, 45 to 60 percent slopes.
Calvin shaly loam, 20 to 30 percent slopes.
Calvin shaly loam, 30 to 45 percent slopes.
Calvin-Berks channery loams, 20 to 30 percent slopes, moderately eroded.
Calvin-Berks channery loams, 30 to 60 percent slopes, moderately eroded.
Calvin-Montevallo shaly loams, 20 to 30 percent slopes, moderately eroded.
Calvin-Montevallo shaly loams, 20 to 45 percent slopes, severely eroded.
Calvin-Montevallo shaly loams, 30 to 60 percent slopes.
Chandler silt loam and channery silt loam, 20 to 30 percent slopes.
Corydon very rocky clay loam, 3 to 45 percent slopes, moderately eroded.
Eroded land, shale and schist materials.
Hazel channery silt loam, 10 to 20 percent slopes, moderately eroded.
Hazel channery silt loam, 10 to 20 percent slopes, severely eroded.
Hazel channery silt loam, 20 to 30 percent slopes, moderately eroded.
Hazel channery silt loam, 20 to 30 percent slopes, severely eroded.
Hazel channery silt loam, 30 to 45 percent slopes.
Litz shaly loam, 20 to 30 percent slopes, moderately eroded.
Litz shaly loam, 20 to 30 percent slopes, severely eroded.
Litz shaly loam, 30 to 45 percent slopes, moderately eroded.
Litz shaly loam, 30 to 45 percent slopes, severely eroded.
Litz shaly loam, 45 to 60 percent slopes.
Litz-Teas channery silt loams, 15 to 25 percent slopes, moderately eroded.
Litz-Teas channery silt loams, 15 to 25 percent slopes, severely eroded.
Litz-Teas channery silt loams, 25 to 45 percent slopes, moderately eroded.
Montevallo shaly loam, 10 to 20 percent slopes, severely eroded.
Montevallo shaly loam, 20 to 30 percent slopes, moderately eroded.
Montevallo shaly loam, 20 to 30 percent slopes, severely eroded.

SOIL GROUP 7 FOR SEWAGE DISPOSAL

Soil group 7 for sewage disposal contains soils that are very poor or unsuitable for this use. The soils have impeded drainage and a seasonally high water table, but they are not subject to flooding.

The percentage of septic tanks that failed to function properly, as reported in Maryland, is greater on the soils of group 7 than on those of any other group. It can be predicted that, with few exceptions, septic tanks on these soils will fail. The soils have very slowly permeable subsoil of fine clay or dense, compact silt, or both. Water moves too slowly in these soils for the effluent to be absorbed. Little movement can be observed except in the surface layer. It has been observed, for example, that

the surface layer can be saturated with water while the lower subsoil appears to be only moist. Apparently, little water can penetrate into the subsoil or through it.

The appearance of some of the soils of group 7 for sewage disposal can be extremely misleading to a casual or untrained observer. The soils are on uplands, are gently or moderately sloping, and appear to be ideal homesites. No matter how pleasant the landscape, however, the soils are not suitable for disposal of sewage from septic tanks.

The soils of group 7, fortunately, are not extensive. There are many small spots of them, however, in all parts of the county. The spots are scattered in nearly all sections, except in the great limestone valley.

Brinkerton silt loam, 0 to 8 percent slopes.
Buchanan gravelly loam, 0 to 3 percent slopes.
Buchanan gravelly loam, 3 to 8 percent slopes, moderately eroded.
Buchanan gravelly loam, 8 to 15 percent slopes, moderately eroded.
Buchanan gravelly loam, 15 to 25 percent slopes, moderately eroded.
Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded.
Landisburg cherty silt loam, 8 to 25 percent slopes, moderately eroded.
Leadvale gravelly silt loam, 0 to 3 percent slopes.
Leadvale gravelly silt loam, 3 to 8 percent slopes, moderately eroded.
Monongahela gravelly loam, 3 to 8 percent slopes, moderately eroded.
Monongahela gravelly loam, 8 to 15 percent slopes, moderately eroded.
Monongahela silt loam, 0 to 3 percent slopes.
Monongahela silt loam, 3 to 8 percent slopes, moderately eroded.
Monongahela silt loam, 8 to 15 percent slopes, moderately eroded.
Monongahela silt loam, 15 to 25 percent slopes, moderately eroded.
Rohrersville silty clay loam, 0 to 8 percent slopes, moderately eroded.
Trego gravelly silt loam, 0 to 3 percent slopes.
Trego gravelly silt loam, 3 to 15 percent slopes, moderately eroded.
Tyler silt loam, 0 to 8 percent slopes.

SOIL GROUP 8 FOR SEWAGE DISPOSAL

Soil group 8 for sewage disposal contains the soils that are subject to flooding and, hence, are unsuitable for this purpose regardless of their other characteristics.

The Ashton soil of this group is well drained and lies above many minor floods, but it is likely to be flooded at high-water stages. The Congaree, Huntington, and Pope soils are less easily and less frequently flooded than the rest of the group, but the hazards on them are so great that septic tanks should not be installed, even though they might work satisfactorily for most of the year.

Ashton fine sandy loam, 0 to 5 percent slopes.
Atkins silt loam.
Chewacla gravelly sandy loam.
Chewacla silt loam.
Chewacla stony silt loam.
Congaree silt loam and gravelly loam.
Dunning and Melvin silty clay loams.
Huntington fine sandy loam.
Huntington gravelly loam.
Huntington silt loam.
Huntington silt loam, local alluvium.
Largent silt loam.
Lindside silt loam.
Lindside silt loam, local alluvium.
Melvin silt loam.
Philo gravelly sandy loam.
Philo silt loam.
Pope fine sandy loam.
Pope gravelly loam.
Pope gravelly sandy loam.
Pope silt loam.
Pope stony gravelly loam.
Terrace escarpments.
Warners loam, 0 to 8 percent slopes.
Wehadkee silt loam.

This grouping of soils is a guide to the possibilities of sewage disposal in Washington County. For any site that is doubtful, actual testing of the soil is essential before a disposal field is planned.

Use of the Soil Survey in Community Planning

In planning and zoning activities, a county generally will benefit if a considerable part of the soils suitable for farming can be reserved for that purpose. However, as a rule, the soils that are best for farming are also good for building sites. An orderly plan for land use, made by the local people and their representatives, is desirable to prevent intensive competition for the best soils for different kinds of use.

In the section preceding this one, the soils have been grouped according to their suitability for disposal of sewage, with special reference to the outflow from septic tanks. The same groups of soils can serve other purposes in planning uses of suburban land.

Soil groups 1, 2, and 4 for sewage disposal include most of the soils that make the best farmland. The soils of these groups should be considered for permanent farming use as cropland or pasture. Some of the soils of group 8 also are valuable for farming, even though they are sometimes flooded. The Ashton, Congaree, Huntington, and Pope soils of group 8 are in capability class I because they have few limitations of any kind for the production of crops.

In suburban communities land is needed for public recreational uses. Within practical limits some of the soils, least valuable for farming, should be reserved for parks and other public areas. Soils of groups 3, 6, and 7, and some of those in group 8, can be used to good advantage for parks and recreation.

The sloping and steep soils of groups 3 and 6 are almost ideal for parks and other recreational areas. Some of the steep soils have been eroded, and many areas are in woods. Steep hillsides and the adjoining narrow bottom lands are not well suited to use as farms or as building lots.

Parks should be kept in forests, insofar as possible. A few areas need to be cleared, and many could be reforested. Reforestation increases esthetic values and also helps retard runoff, control erosion, and reduce the danger of flooding. Protective vegetation is especially valuable on the highly erodible soils of groups 3 and 6 for sewage disposal.

Soils of group 7 for sewage disposal have a very slowly permeable subsoil and tend to be wet at times, some of them for a large part of the year. With good surface drainage and careful disposal of surface water, these soils can be used as residential sites, provided a complete sewage disposal system is installed so that owners will not have to depend on septic tanks. The soils of

group 7, particularly those that are in scattered, small areas, can also be used for small community parks.

The soils of groups 4, 5, and 6 are rather shallow over hard rock. These soils furnish excellent footings for industrial plants or other heavy buildings.

In any area the cost of revegetating or otherwise stabilizing cuts, fills, roadbanks and shoulders, and other disturbed areas can be an important item. One of the columns of table 7 indicates the general suitability of topsoil that can be obtained from each of the soils of the county. Use of good topsoil for facing disturbed areas helps in the difficult task of establishing protective vegetation on them.

Formation and Classification of Soils

Soils are the products of soil-forming processes acting on materials deposited or accumulated by geologic forces. The important factors in soil formation are parent material, climate, living organisms, topography, and time.

Factors of Soil Formation

Climate and living organisms, particularly vegetation, are the active forces in soil formation. Their effect on the parent material is modified by topography and by the length of time the parent material has been in place. The relative importance of each factor differs from place to place. Occasionally, one factor dominates and fixes most of the properties of the soil, but normally the interaction of all five factors determines what kind of soil develops in any given place.

Parent material

The soils of Washington County developed from two general kinds of parent materials. The more extensive is residuum formed by the weathering of rocks in place. The other consists of sand, silt, clay, and rock fragments that were transported by water, wind, or gravity, or by a combination of these agents.

The residual material was derived from many different kinds of rocks. About one-twentieth of the county is underlain by rocks of igneous origin. But, at some time since their origin, they have been metamorphosed by heat, pressure, and movement into what are now the metabasalts, or so-called greenstones. Upon these rocks have been developed the soils of the Fauquier, Myersville, and Highfield series. The soils occur chiefly in Pleasant Valley and in the extreme northeastern part of the county along the Frederick County line.

Most of the county is occupied by rocks originally of sedimentary origin. These rocks are made up of fine- to coarse-grained materials that were deposited in bodies of water and subsequently transformed into rock by compaction, cementation, and chemical and other consolidation processes over long periods of time.

The unaltered sedimentary rocks are of various kinds. Limestone of various degrees of purity has produced parent materials of the Hagerstown, Frankstown, Duffield, Frederick, Dunmore, Elliber, Benevola, and Corydon soils. The Litz soils are from slightly calcareous, gray shales. The Montevallo soils are from acid, gray shales, the Berks soils from acid, yellow to brown shales, the Calvin soils from acid, red shales and sandstones, and the Teas soils from slightly calcareous, red shales and sandstones. Interbedded shales, sandstones, and limestones have produced the Westmoreland soils. Gray to yellow sandstones, in some places quartzitic, are the parent materials of the Dekalb and Leetonia soils, and red sandstones, the parent materials of the Lehew soils.

Other rocks of sedimentary origin have, in early geologic periods, been metamorphosed. Micaceous schists and phyllites have produced the Hazel and Chandler soils, and quartzites and quartzitic sandstones are the parent materials of the Edgemont soils. The Talladega soils are also residual from micaceous schists, but they have been influenced by admixtures of sandstones and quartzite.

The second group of parent materials, as has already been noted, consists of those which have been transported. The areas of such deposits are along present or former watercourses, or in foot-slope accumulations of colluvial debris.

On the most recent alluvial deposits are the flood-plain soils of the Atkins, Chewacla, Congaree, Dunning, Huntington, Largent, Lindside, Melvin, Philo, Pope, Warners, and Wehadkee series. On older alluvial deposits, which are now in terrace positions above present flood plains, are the soils of the Ashton, Etowah, Holston, Monongahela, Tyler, and Waynesboro series.

The soils occurring on deposits of colluvial debris of various kinds include those of the Braddock, Brinkerton, Buchanan, Landisburg, Leadvale, Laidig, Murrill, Rohrersville, Thurmont, and Trego series. There is also some evidence that the Edgemont soils of Washington County may be at least influenced by, if not partially derived from, colluvial materials.

In age the parent materials of the soils of Washington County range from very young to very old. The alluvium deposited on the flood plains during Recent geologic time is the youngest parent material. New material is added to these deposits yearly by flooding or overwashing. Slightly older is the material on the terraces along major streams; it was deposited during the Pleistocene epoch. Shales and sandstones on Sideling Hill in the western part of the county are of Carboniferous age. Most of the shales and sandstones, and some of the limestones from Fairview Mountain westward, are Devonian, but some of them are even older, of the Silurian period. Most of the rocks of the Great Valley are Ordovician, but some are Cambrian, as are also the sedimentary rocks of South Mountain and Elk Ridge (*4*). Even older, probably Precambrian, are the metabasalts (*5*).

Climate

Washington County has a temperate, rather humid climate that is typical of the Middle Atlantic States. The average temperatures and the distribution of rainfall are given in table 9. Throughout the county, climate has been a rather uniform factor in soil development. South Mountain and the other mountains and hills cause some obstruction to the movement of winds, clouds, and rainstorms. Thus, there is the possibility that some local areas might be in a rain-shadow position and might receive less rainfall than is normal for the county as a whole.

TABLE 9.—*Temperature and precipitation at Chewsville Bridgeport, Washington County, Md.*

[Elevation, 560 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1930)	Wettest year (1952)	Average snowfall
	°F.	°F.	°F.	Inches	Inches	Inches	Inches
December	32.9	72	−13	2.61	3.46	2.76	5.3
January	30.8	78	−27	2.70	1.45	3.69	8.3
February	31.2	76	−20	2.17	1.25	1.31	7.6
Winter	31.6	78	−27	7.48	6.16	7.76	21.2
March	41.2	88	−7	3.01	3.45	3.29	5.2
April	50.5	94	9	2.97	2.49	7.80	1.0
May	61.0	96	23	3.52	1.92	5.53	[3]
Spring	50.9	96	−7	9.50	7.86	16.62	6.2
June	69.4	100	30	4.00	5.60	3.88	[3]
July	74.0	103	42	3.66	.69	2.80	0
August	71.9	104	39	3.87	.73	2.94	0
Summer	71.8	104	30	11.53	7.02	9.62	[3]
September	65.9	99	25	3.07	2.81	5.58	[3]
October	54.4	95	19	2.97	.24	1.27	.1
November	43.2	83	−4	2.26	.48	6.07	1.0
Fall	54.5	99	−4	8.30	3.53	12.92	1.1
Year	52.2	104	−27	36.81	24.57	46.92	28.5

[1] Average temperature based on a 58-year record, through 1935; highest and lowest temperatures on a 55-year record, through 1952.
[2] Average precipitation based on a 58-year record, through 1955; wettest and driest years based on a 58-year record, in the period 1889–1955; snowfall based on a 55-year record, through 1952.
[3] Trace.

In a temperate climate there are generally leached, acid soils, and this is true in Washington County. Many of the rocks have been weathered to a rather great depth. Some of the rocks not deeply weathered are highly resistant to the weathering processes, and, in some places, geologic erosion has kept pace with formation of the regolith. Although large areas of soils in Washington County have been developed from limestone, in only a few minor places are there any free carbonates remaining in the soils. Most of the soils of the county are acid, whether they developed from acid rocks or from limestone, and many of them are strongly acid. Fertility levels range from very low to very high. Many of the less fertile soils can be made productive with suitable management.

Living organisms

Before settlement of the county, the native vegetation made up most of the important living organisms that affected soil development. The activity of larger animals was apparently of little importance, with soil animals, such as earthworms, having a greater effect. The first settlers in the county found a dense cover of hardwood forest. The oaks have been, at least in historic time, the dominant trees in all sections of the county. Other important trees included hickory, chestnut, maple, dogwood, and a smaller number of other hardwoods. The chestnut is no longer present, except as recurring sprouts from the bases of trees that were destroyed by chestnut blight earlier in this century. It is doubtful if there were many conifers before the county was settled.

Hardwood trees are heavy feeders on calcium and other basic elements. Bases are returned to the surface of the soil each year with leaf fall; when the leaves are decomposed, bases reenter the soil and are reutilized by plants. Thus, we have a never-ending base cycle, and soils in which the subsoil and parent material furnish a good supply of basic elements do not easily become highly leached under forest vegetation. After enough time, however, in a climate such as that of Washington County, all the soils will become leached.

With the development of agriculture in Washington County, man has affected the character and composition of the soils. Primary effects have been altering of the surface by plowing and exposure of the surface to accelerated erosion. The clearing of forests, deep plowing, introduction of new crops, use of lime and fertilizer, and some artificial improvement of drainage will be reflected in the direction and rates of soil formation and in the future morphology of the soil.

Topography

There are three major physiographic divisions in Washington County. In the east there is the Blue Ridge (South Mountain) and the associated Elk Ridge, on and close to the county line. Then, there is the broad, shallow Great Valley with its gently rolling floor, extending westward to Fairview Mountain. From the latter mountain westward to the end of the county is a succession of low, but rather sharp, ridges with intervening small valleys or, in some places, merely ravines; this part is known as the Appalachian ridge and valley section. Each of these three great divisions is more or less sharply differentiated from the adjoining ones.

Within each of the major physiographic areas, there are soils in three positions: Uplands, colluvial slopes and old stream terraces, and present flood plains.

Among soils of the 24 series that developed in residuum from the upland rocks, differences as a rule are more closely related to the kind of rock than to topography. Within a soil series, however, the soils on steep slopes tend to be thinner over the rock than those on gentle slopes.

In colluvial areas and on stream terraces, there is generally a relationship between topography and soils. The rather highly oxidized Braddock soils and the less well-oxidized Thurmont soils occupy sloping to rolling topography where probably there has always been adequate runoff. In depressions, on similar materials, there have been developed the poorly drained Rohrersville soils, where not only fine materials, but also much seepage and runoff water, have accumulated. All of the soils of the Braddock, Thurmont, and Rohrersville series are on essentially the same kind of parent materials, so the differences cannot be attributed to parent material. The most obvious explanation is that of differences in topography.

The same relationship is essentially true on some of the old alluvial terraces. Holston soils, which are moderately oxidized, and the Waynesboro soils, which are highly oxidized, occupy the better drained positions; Monongahela soils have developed where topography encouraged the formation of a dense layer called a fragipan, and Tyler soils have developed on the finest grained materials in depressions and other low places. All of these soils have been formed in alluvium from acid sandstones and shales. The differences in drainage have resulted from differences in profile development as influenced by topography.

Time

The length of time the parent material has been in place and exposed to the active forces of climate and vegetation is an important factor in soil formation. The age of a soil, however, refers to its degree of profile development and is influenced by other factors as well as by time. A mature soil is one that has well-defined, genetically related horizons; an immature soil is one that shows little or no horizonation. Because of differences in topography and parent material, soils that have been developing for about the same length of time will not necessarily have reached the same stage of profile development. If the parent rock is resistant and weathers slowly, profile development is slow. If the slope is steep, some soil is gradually removed, and many of the soils lack well-defined horizons. On flood plains, frequent deposition of fresh alluvium prevents the development of a mature profile.

In Washington County the Fauquier soils and the Hagerstown soils of the uplands are examples of mature soils; in them, the rate of weathering and soil formation exceeds the rate of geologic erosion. The Hazel soils of the upland slopes are very immature; in them, the rate of weathering of the resistant material is slow and is exceeded by the rate of geologic erosion. The Pope soils of the flood plains are immature because their parent material is continually renewed.

Morphology of Soils

Some soils of Washington County have moderate to strong horizonation, but the younger soils, in both alluvial and residual materials, show very little horizonation.

The differentiation of horizons in soils of the county is the result of one or more of the following major processes: (1) Accumulation of organic matter, (2) leaching of carbonates and salts, (3) chemical weathering of the primary minerals of rocks and parent materials into silicate clay minerals, (4) translocation of silicate clay minerals, and probably of some silt-size particles, from one horizon to another, and (5) chemical reduction and transfer of iron.

In most soils of the county, several of these processes have operated in the development of horizons. For example, the first four processes are reflected in the strong horizons of such deep, well-drained soils as those of the Fauquier, Hagerstown, and Dunmore series, and all five processes have had effects on soils of the Monongahela, Leadvale, and Trego series. On the other hand, only processes 1 and 5 have had much effect on the Melvin, Wehadkee, and Atkins soils, and some organic accumulation (process 1) is the only obvious process in the Pope, Huntington, and Congaree soils. On these soils, however, any of the processes mentioned above may have taken place in the soil materials before they were moved and deposited as new alluvium.

Some organic matter accumulated in all of the soils of Washington County to form an A_1 horizon. The A_1 horizon is thin in most soils, and in the plowed soils it has lost its identity to become an A_p or part of the A_p horizon. In a few soils, such as the Dunning, the A_1 horizon is thicker than the plowed layer. The amount of organic matter ranges from very low to moderately high. The soils of the Montevallo series contain so little organic matter that even in the unplowed soils it is scarcely apparent. The Dunning soils have a thick, prominent A_1 horizon that contains perhaps as much as 5 percent organic matter.

Leaching has translocated minerals in most of the soils in the county. The carbonates have been completely leached out of the A and B horizons of all the soils, except those of two series. The Warners soils and some areas of the Melvin soils contain lime. There are some free carbonates in the Melvin, and the Warners soils are marly and calcareous throughout. Both consist of very recently deposited material, and there has been some replenishment of carbonates to offset removal of carbonates by leaching. Some other soils of the county, particularly those of the Lindside series, contain a large amount of exchangeable calcium, but have no free carbonates. All of these soils are young, and they would become leached if they did not receive neutral or lime-bearing sediments from time to time.

The result of complete weathering in this environment would be the production of clay that is dominantly kaolinite (*3*). Actually, although kaolinite is probably the most characteristic clay mineral in mature soils of this area, other clay minerals, such as halloysite, illite, vermiculite, and montmorillonite, are also present in many of the soils. Their presence shows that in spite of the long exposure of minerals during geologic time, the weathering processes have not yet reached their end point. The processes may have reached a point where the soils and their accompanying chemical processes are in at least temporary equilibrium with the environment.

Translocation of silicate clay minerals has contributed strongly to the development of horizons in most of the soils of the county. Silicates have been removed, in part, from the A horizon of the soils and have become partly immobilized in the B horizon. This is true in all the soils that have a textural B horizon, and is probably true to some slight degree in soils that do not have a distinct textural B horizon. The effects of translocation are illustrated most strongly in the soils that have a fine-textured B horizon, such as those of the Fauquier, Waynesboro, Hagerstown, and particularly of the Brinkerton and Dunmore series.

The solution and transfer of iron have occurred to some degree in all the soils, and particularly in the wet soils. The formation of reduced iron compounds that give the soil a neutral gray color is known as gleying. In soils of the Dunning, Brinkerton, Atkins, Melvin, Tyler, and Wehadkee series, there has been considerable

movement of iron. In the drier soils, movement of iron has been less marked, but generally there has been movement from the A to the B horizon.

In some of the gently sloping and slightly depressed soils, there has been accumulation of clay minerals and of silt in the subsoil. This accumulation brings about the formation of a horizon, generally a part of the B horizon, that is very dense and compact. This horizon can be either a claypan or a fragipan. A claypan is a dense subsoil horizon that has a high content of clay, such as the subsoil in Tyler soils. A fragipan is a firm, dense, brittle horizon that, as a rule, contains more silt and sand than clay. The Buchanan, Landisburg, Leadvale, Monongahela, Rohrersville, and Trego soils are examples of those containing a fragipan. Either claypan or fragipan causes impeded drainage, which in turn brings about the reduction and transfer of iron or the gleying that was mentioned in the preceding paragraph.

Iron that is reduced under conditions of poor aeration usually is made soluble. It may be removed from the soil entirely. Commonly, however, in the soils of Washington County, it has moved only a short distance and may have stopped either in the same horizon where it originated or in another nearby horizon. Part of this iron may become reoxidized and segregated to form the yellowish-red, strong-brown, or yellowish-brown mottlings that are common in the gleyed horizons of soils and indicate impeded drainage.

When primary minerals are changed to silicate clay, there is usually some iron set free as a hydrated oxide. Depending upon the degree of hydration, these oxides are more or less red in color. A small amount of these oxides is sufficient to color a soil strongly, particularly where silicate clay minerals are not in great abundance and where the parent materials are fairly coarse in texture. Under these conditions, a strongly colored subsoil, or "color B" horizon, is formed, even though there may not have been enough accumulation of clay minerals to form a textural B horizon.

In Washington County a B horizon that has strong-red colors, which indicate the presence of free iron oxides, is generally also a strong textural B horizon that contains a definite accumulation of silicate clay minerals. The most strongly developed B horizons in the county are those in the Etowah, Fauquier, Hagerstown, Waynesboro, and Benevola soils.

A detailed description of one representative profile of each soil series of the county is given in this report in the section "Descriptions of the Soils."

Classification of Soils by Great Soil Groups

Soils are placed in narrow classes to facilitate the organization and application of knowledge about their use and management on individual farms. They are placed in broad, inclusive classes to facilitate study and comparison of large areas, such as countries or continents. In the comprehensive system of soil classification that has been followed in the United States (*2*), the soils have been placed in six categories. Beginning with the most inclusive category, these are the order, suborder, great soil group, family, series, and type.

There are three soil orders and thousands of soil types. The concepts of suborder and family have never been fully developed. The type and the series are the categories most commonly used in discussing the soils of a county or other small area. Series that are alike in several characteristics are classified as one great soil group.

The great soil groups that are presently recognized in Washington County are Sols Bruns Acides, Podzols, Gray-Brown Podzolic soils, Red-Yellow Podzolic soils, Reddish-Brown Lateritic soils, Planosols, Humic Gley soils, Low-Humic Gley soils, Lithosols, and Alluvial soils. Many of the soils do not fit the modal or central concept of any one great soil group. These soils, which are called intergrades, have enough characteristics of a given great soil group to be included in that group, but they have one or more characteristics of another group. One great soil group toward which some of the soils of the county intergrade is the group of Terra Rossa soils.

Sols Bruns Acides

Sols Bruns Acides have a weak A_1 horizon and a very weak A_2 horizon, or none at all. The B horizon is differentiated almost entirely by color, and its clay content is the same or only slightly higher or lower than that of the horizons above and below. By definition, the B horizon is redder or higher in chroma than the A and C horizons. Also, there is little structural development or differentiation. These soils have a low degree of base saturation and are generally very strongly acid.

Sols Bruns Acides are represented in Washington County by two series that are typical of this group. These are the Dekalb and Lehew series.

Podzols

Podzols have a thin, dark-colored A_1 horizon, a light-gray A_2 horizon a few inches thick, and a brown or dark-brown B_2 horizon over lighter colored parent material. The A_2 horizon is strongly leached, and the B_2 horizon is a zone of accumulation of iron, organic matter, or both. The degree of base saturation is extremely low, and the soils are very strongly acid to extremely acid.

There is only one Podzol in Washington County. This is the Leetonia series, found only at higher elevations on South Mountain.

Gray-Brown Podzolic soils

Of the 52 soil series of Washington County, 14 are dominated by characteristics of the great soil group known as Gray-Brown Podzolic soils. These soils are typical of forested, cool-temperate, humid regions. In the natural state, a Gray-Brown Podzolic soil has a fairly thin leaf litter and a rather thin humus layer over a dark-colored mineral surface layer. There is a grayish-brown leached subsurface horizon over a moderately heavy, blocky B horizon. The B horizon may be brown, yellowish brown, brownish yellow, or reddish brown. The profile is moderately thick to thick. Reaction is most commonly slightly acid, but may range from medium acid to neutral.

Only one series of soils in Washington County is representative of the central concept of Gray-Brown Podzolic soils. This is the Duffield series, which consists of soils that developed from materials high in lime. The soils of 12 other series are classified as Gray-Brown Podzolic

soils, but they have some characteristics of other groups.

The Edgemont, Elliber, Frankstown, Frederick, Hagerstown, Highfield, Murrill, Myersville, and Westmoreland series consist of Gray-Brown Podzolic soils that have some of the characteristics of Red-Yellow Podzolic soils. They are somewhat more strongly leached than typical Gray-Brown Podzolic soils. The A_2 horizon is more strongly bleached, and the B horizon is more red or yellow and less brown. These intergrades are characteristically more acid throughout than the modal Gray-Brown Podzolic soils.

The Berks soils are Gray-Brown Podzolic soils that have some of the characteristics of Lithosols. Lithosols are very immature soils being developed from hard rock material, and they do not have complete horizonation. The Berks soils are shallow over bedrock of shale and contain much skeletal shale material, but they do have a faint, though not distinct, B horizon of clay accumulation characteristic of the Gray-Brown Podzolic group.

The Ashton series consists of young or immature Gray-Brown Podzolic soils being developed from fairly recent, though not contemporary, alluvium. Horizonation is weak. The Ashton soils are said to be Gray-Brown Podzolic soils intergrading toward Alluvial soils.

Red-Yellow Podzolic soils

The central concept of this group is that of well-developed, well-drained, acid soils that have a thin, organic-mineral A_1 horizon, a light-colored, bleached, and leached A_2 horizon, and a red, yellowish-red, reddish-yellow, or yellow, much finer textured B horizon. The parent material is commonly, though not invariably, more or less siliceous; where it is thick, it is commonly marbled or otherwise variegated in color. The chroma of the B horizon is high, 6 or above. The reaction is normally strongly acid or very strongly acid.

Representative of the central concept of the Red-Yellow Podzolic soils are the Braddock, Dunmore, Holston, Thurmont, and Waynesboro series. Perhaps the morphology of the Waynesboro series most nearly represents modal Red-Yellow Podzolic soils.

Other soils of the Red-Yellow Podzolic great soil group are characterized by a fragipan horizon below the normal B horizon. These fragipans are dense, compact, platy in structure, normally highly silty, and slowly or very slowly permeable to water. They obstruct the penetration and development of roots. Most of them are only moderately well drained. Morphologically, the soils are typical Red-Yellow Podzolic soils, but they have also the fragipan horizon. In spite of drainage that is usually impeded, they are not said to be intergrades toward any other great soil group, but are simply known as Red-Yellow Podzolic soils with fragipans.

The soils of Washington County that fall into this class are those of the Buchanan, Laidig, Landisburg, Leadvale, Monongahela, and Trego series.

The soils of the Etowah and Fauquier series are intergrades to the Reddish-Brown Lateritic group. The B horizon of these soils closely resembles that of Reddish-Brown Lateritic soils, which are normally found in subtropical or very warm-temperate climatic zones. These B horizons are red to dark red, fine textured, and presumably contain free oxides of iron and aluminum. The subsoils are porous, and the soils are well drained.

Reddish-Brown Lateritic soils

Reddish-Brown Lateritic soils are closely related to, and have much the same geographic distribution as, the Red-Yellow Podzolic soils. They have been formed from less siliceous parent material; for example, from material weathered from basic rocks, such as basalt or limestone. Thus, the parent materials are commonly lower in quartz or its equivalent and higher in alkaline earth elements, such as calcium, than those giving rise to Red-Yellow Podzolic soils. Reddish-Brown Lateritic soils have a thick, dark A_1 horizon, lack A_2 horizon, and are dark in color in the B horizon. The degree of weathering of minerals in the soil profile is much the same as for Red-Yellow Podzolic soils.

The Benevola series is tentatively classified as a Reddish-Brown Lateritic soil intergrading to the Terra Rossa group. Benevola soils are comparable to typical members of the group in features such as color, texture, structure, and consistence of horizons in the solum. On the other hand, these horizons are less acid in reaction than those of typical Reddish-Brown Lateritic soils. Benevola soils have reddish-brown clay loam surface layers over dark-red clay subsoils that have compound blocky and granular structure. The subsoils are porous, which is uncommon for clays that are firm when moist and sticky and plastic when wet. Overlying hard, sandy limestone or calcareous sandstone, Benevola soils are neutral to mildly alkaline in reaction throughout the solum. This is the reason for considering them intergrades to the Terra Rossa group, soils found in the Mediterranean region of Europe and Africa, where climates are much less humid and many soils are calcareous to the surface.

Planosols

The great soil group known as Planosols is defined as a group of soils having one or more horizons abruptly separated from, and sharply contrasting to, an adjacent horizon because of cementation, compaction, or high clay content (*8*).

There are two such soil series in Washington County, the Rohrersville and the Tyler. Each has a dense B horizon that causes the soil to be poorly drained. The Tyler soils have a clay B horizon, and the Rohrersville soils have a B horizon of compact, platy, silty clay loam to sandy clay loam.

Humic Gley soils

Humic Gley soils are poorly drained or very poorly drained. They have a thick, prominent A horizon that has a high content of organic matter and a strongly reduced or mottled B horizon or subsoil. The mottling or gleying in some places extends upward into the lower part of the A horizon.

Only one soil in Washington County is classified in the Humic Gley great soil group. This is the Dunning series, which contains the most poorly drained soils in the county. It occupies recent flood plains, but the soil materials have been in place long enough to have developed a characteristic Humic Gley profile.

Low-Humic Gley soils

This great soil group consists of poorly drained soils that normally have a thin surface horizon that is moder-

ately high in organic matter, and a mottled or gleyed mineral subsoil. There is generally some textural differentiation between the various horizons. Besides alluviation, there is, in many places, some surface accumulation of fine material that washed in from adjacent higher areas. The Low-Humic Gley soils differ from the Humic Gley soils in that the latter have a prominent A horizon that has a high content of organic matter, and a more strongly gleyed B horizon.

Only one soil series in the county is in the Low-Humic Gley great soil group. This is the Brinkerton series. The soils are wet much of the time; the high water table is a result of seepage.

There are three poorly drained soils that have characteristics of the Low-Humic Gley group but that grade toward Alluvial soils. These soils, of the Atkins, Melvin, and Wehadkee series, consist of recently deposited floodplain sediments and are subject to frequent flooding or overwash and to deposition of new material on the surface.

Lithosols

A Lithosol has an incomplete solum or no clearly expressed soil morphology. It consists of an imperfectly weathered mass of rock fragments, and normally has an incipient A horizon but no B horizon. Lithosols are generally confined to steeply sloping areas, or to areas of very resistant rock where geologic erosion has removed soil as fast as it was formed.

Eight soil series in Washington County belong to this group, but only three of them fit the central concept of Lithosols. These are the Chandler, Hazel, and Montevallo series.

The Corydon series is a Lithosol with some additional characteristics of Gray-Brown Podzolic soils. It consists of shallow clay loam underlain by and developing from limestone, and has a few to many rock outcrops. It has a very weakly developed B horizon, somewhat like that in the Gray-Brown Podzolic soils.

The Calvin, Litz, and Teas soils are Lithosols that intergrade toward Sols Bruns Acides. They have a very weakly developed B horizon that resembles that of the Sols Bruns Acides. The normal or modal Talladega soil would be a true Lithosol, but only a thick variant is mapped in Washington County, and this variant is an intergrade toward Red-Yellow Podzolic soils.

Alluvial soils

Alluvial soils consist of deposits of recent alluvium on flood plains. They have little, if any, horizonation or other significant observable effects of true soil-forming processes. Although they are composed of soil in the general agricultural sense, they are little more than parent materials in the genetic sense, even though the soil particles may once have been parts of genetic soils at other locations.

The Chewacla, Congaree, Huntington, Largent, Lindside, Philo, Pope, and Warners series consist of Alluvial soils. The Congaree, Huntington, and Pope soils are deep and well drained. They have no horizonation, except for some slight accumulation of organic matter near the surface. They have no impediment to internal drainage, although they may be in positions that are flooded.

Soils of the Chewacla, Largent, Lindside, and Philo series are moderately well drained or somewhat poorly drained. Because the water table is high for a fairly large part of each year, there is some evidence of slight gleization in the lower part of the subsoil. They are, however, within the central concept of Alluvial soils.

The Warners soils have variable drainage; they are poorly drained in many places and moderately well drained in others. They consist of marly alluvium that has been somewhat darkened in the surface layer by organic matter, but they have little other evidence of genetic horizonation.

599553—62——9

Literature Cited

(1) American Association of State Highway Officials.
1955. standard specifications for highway materials and methods of sampling and testing. Ed. 7, 2 v., illus.

(2) Baldwin, Mark, Kellogg, Charles E., and Thorp, James.
1938. soil classification. *In* U.S. Dept. Agr. Ybk., Soils and Men, pp. 979–1001.

(3) Brancato, G. N.
1951. the climate of washington county. *In* The Physical Features of Washington County, published by the Maryland Board of Natural Resources, Dept. of Geol., Mines and Water Resources, pp. 254–266. Waverly Press, Baltimore.

(4) Cloos, Ernst.
1951. stratigraphy of sedimentary rocks. *In* The Physical Features of Washington County, published by the Maryland Board of Natural Resources, Dept. of Geol., Mines and Water Resources, pp. 17–94. Waverly Press, Baltimore.

(5) ———
1951. igneous rocks. *In* The Physical Features of Washington County, published by the Maryland Board of Natural Resources, Dept. of Geol., Mines and Water Resources, pp. 95–97. Waverly Press, Baltimore.

(6) Hamilton, A. B.
1956. comparative census of maryland agriculture by counties. Univ. of Md. Ext. Serv., Misc. Ext. Pub. No. 32f, 52 pp.

(7) Matthews, Earle D.
1960. soil survey, frederick county, maryland. U.S. Dept. of Agr., Soil Conserv. Serv., in coop. with Maryland Agr. Expt. Sta., Soil Survey Ser. 1956, No. 15, 144 pp., illus.

(8) Thorp, James, and Smith, Guy D.
1949. higher categories of soil classification: order, suborder, and great soil groups. Soil Sci. 67(2): 117–126.

(9) U.S. Department of Agriculture.
1951. soil survey manual. U.S. Dept. Agr. Handb. 18, 503 pp., illus. [Replaces U.S. Dept. Agr. Misc. Pub. 274, the Soil Survey Manual Pub. 1937.]

(10) Waterways Experiment Station, Corps of Engineers.
1953. unified soil classification system. Tech. Memo. No. 3–357, v. 1.

Glossary

AASHO classification (engineering). The system of soil classification of the American Association of State Highway Officials.

Alluvial soil. A soil on a flood plain, consisting of essentially unaltered alluvium.

Alluvium. Fine material, as sand, silt, or clay, deposited on land by streams or rivers.

Bases. The positive, generally metallic elements or combination of elements that make up the nonacidic plant nutrients. The most important of these in plant nutrition include calcium (Ca), potassium (K), magnesium (Mg), and ammonium (NH_4).

California bearing ratio (engineering). The ratio of the ability of a soil to support weight, to that of a standard crushed limestone, first standardized in California; abbreviated CBR. Thus, a soil with a CBR of 16 would support 16 percent of the load that would be supported by the crushed limestone, per unit area and with the same degree of distortion.

Channery. Containing between 15 and 50 percent flat fragments of sandstone, limestone, or schist up to 6 inches along the the longer axis.

Clay. Small mineral soil grains, less than 0.002 millimeter (0.000079 inch) in diameter; individual grains generally invisible even under an ordinary microscope.

Claypan. A soil horizon or layer rich in clay and separated abruptly from the overlying layers; normally rather compact or massive.

Cobbly. Containing between 15 and 50 percent rounded or partially rounded fragments of rock ranging from 3 to 10 inches in diameter.

Colluvial fans and cones. Formations at the foot of a slope made up of colluvium.

Colluvial soil. A soil at a foot slope or in a depression, consisting of colluvium.

Colluvium. Deposits of soil material and rock fragments accumulated at the bases of slopes through the influence of gravity, in some cases assisted by the flow of water. Such deposits in some places are very small and local; in other places, they are very large and extend for great distances out over valley floors.

Complex, soil. An intimate mixture of areas of different soils, that cannot be indicated separately on a map of the scale used, and are therefore mapped together as a unit.

Dispersion, soil. The breaking down of aggregated clumps of soil particles into individual grains of clay, silt, or sand.

Diversion, or diversion terrace. Any ridge of earth, generally a terrace, that is built to divert runoff water from its natural course and, thus, to protect downslope areas from the effects of such runoff.

Fragipan. A very compact soil horizon, rich in silt and generally relatively low in clay; normally, strongly platy in structure and interfering with the penetration of roots and water.

Gleization or gleying. The reduction, translocation, and segregation of soil compounds, notably of iron, normally in subsoils or substrata; a result of poor aeration and drainage, expressed in the soil by mottled colors dominated by gray.

Gravelly. Containing between 15 and 50 percent rounded or angular fragments of rock, not prominently flattened, up to 3 inches in diameter.

Great soil group. A broad group of soils having internal soil characteristics in common. It includes one or more soil families, and generally a great number of soil series.

Hydrologic soil groups. Groups of soils having similar rates of infiltration by water, even when wetter, and similar rates of water transmission within the soil. There are four such groups of soils currently recognized by the Soil Conservation Service.

Group A. Soils having a high infiltration rate even when thoroughly wetted, consisting chiefly of deep, well-drained to excessively drained sand and/or gravel. These soils have a high rate of water transmission and will have a low runoff potential.

Group B. Soils having a moderate infiltration rate when thoroughly wetted, consisting chiefly of moderately deep to deep, moderately well drained to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission, and will have a moderate runoff potential.

Group C. Soils having a slow infiltration rate when thoroughly wetted, consisting chiefly of (1) soils with a layer that impedes the downward movement of water, or (2) soils with moderately fine to fine texture and slow infiltration rate. These soils have a slow rate of water transmission, and will have a high runoff potential.

Group D. Soils having a very slow infiltration rate when thoroughly wetted, consisting chiefly of (1) clay soils with a high swelling potential, (2) soils with a high permanent water table, (3) soils with a claypan or a clay layer at or near the surface, and (4) shallow soils over nearly impervious materials. These soils have a very slow rate of water transmission, and will have a very high runoff potential.

Igneous rock. A rock formed by the solidification of molten primary rock material or magma.

Internal drainage. That quality of soil that permits the downward flow of excess water through it.

Liquid limit. The moisture content at which a soil material passes from a plastic to a liquid (free-flowing) state.

Low-Humic Gley soils. A great soil group in which the soils are characterized by a weak A_1 horizon over a mottled or partially gleyed mineral B horizon that is normally somewhat finer in texture than the A horizon.

Maximum density. The greatest amount of soil that can be compacted into any unit of volume; expressed as pounds of dry soil per cubic foot.

Mechanical analysis of soil. The determination of the percentage of the soil particles of all sizes—gravels, sands, silts, clays, and all their standard subdivisions; based on the mineral soil only, free of water and organic matter. *Grain size* refers to the size limits of any particular fraction of the soil, and *grain size distribution* refers to the proportions of the various-sized fractions in the whole mineral soil.

Metamorphic rocks. Rocks of any origin that have been so altered by heat, pressure, and movement that their physical nature has become completely changed. Such rocks are nearly always crystalline.

Morphology, soil. The physical constitution of the soil, expressed in the kinds of soil horizons, their thickness and arrangement in the profile, and the texture, structure, consistence, porosity, and color of each horizon.

Poorly graded (engineering). A soil consisting of particles chiefly of the same or very nearly the same size or diameter; having a narrow range of particle size and, thus, poor grain-size distribution. Such a soil can be increased in density only slightly by compaction.

Reaction, soil. The degree of acidity of the soil expressed in pH values, or in words, as follows:

	pH		*pH*
Extremely acid	below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Red-Yellow Podzolic soils. A great soil group in which the soils are characterized by a thin, organic-mineral A_1 horizon, a light-colored, bleached, leached A_2 horizon, and a finer textured, red to yellow B horizon; acid; base saturation in the B horizon is normally less than 35 percent and decreases with depth.

Rocks. The principal kinds of rocks in this county are—

Chert. A flintlike rock, generally found as an impurity in limestone or other sedimentary rocks.

Limestone. A rock made up principally of calcium carbonate, or, in some cases, magnesium carbonate.

Metaandesite. A metamorphosed igneous rock moterately rich in iron and other metallic elements; chemically similar to andesite.

Metabasalt. A metamorphosed igneous rock very rich in iron and other metallic elements; chemically similar to basalt.

Metarhyolite. A rock similar to metaandesite but lower in iron and other metallic elements; chemically similar to granite.

Phyllite. Refers to the appearance or shape of a rock, meaning leaflike; thin, flattened, and generally slightly wavy or crinkled.

Quartz. A mineral that consists of silica, SiO_2.

Quartzite. A sandstone or other quartz-bearing rock that has been altered by heat and pressure until it is definitely fused.

Sandstone. A rock made up chiefly of grains of silica sand cemented together.

Schist. A rock, originally either sedimentary or igneous, that has been altered by heat and pressure until it is crystalline and has a foliated structure, and is more or less easily split into slabs or sheets.

Shale. A rock made up of grains of silt or clay, or both, sometimes with a little sand, that have been cemented together; normally occurs in masses of flattened fragments.

Sand. Rock or mineral fragments, visible to the normal naked eye, between 0.05 millimeter (0.002 inch) and 2.0 milimeters (0.079 inch) in diameter. As a textural class, a soil that is 90 percent or more sand.

Sedimentary rock. Rock formed by the consolidation of any of many kinds of sediment. Sandstone, shale, and limestone are common sedimentary rocks.

Shaly. Refers to soil material of which 15 to 50 percent consists of flattened fragments of shale less than 6 inches along the longer axis. A single piece is a shale fragment. Larger fragments are *flags* or *flagstones.*

Shrink-swell potential. The ability of a soil to lose volume with a loss in water content and to gain volume with an increase in water content.

Silt. Small mineral soil grains ranging from 0.002 millimeter (0.000079 inch) to 0.05 millimeter (0.002 inch) in diameter; not visible to the naked eye but readily visible under a microscope.

Soil consistence. The characteristics of soil material that are expressed by the degree and kind of cohesion and adhesion, or by the resistance of the soil material to deformation or rupture. When dry, a soil is said to be *loose, soft, slightly hard, hard, very hard,* or *extremely hard.* When moist, a soil is said to be *loose, very friable, friable, firm, very firm,* or *extremely firm.* When wet, a soil is said to be *nonplastic, slightly plastic, plastic,* or *very plastic,* and also *nonsticky, slightly sticky, sticky,* or *very sticky.*

Soil erosion. The removal of soil material by geologic agencies, principally wind and running water. *Accelerated erosion* refers to loss of soil material brought about by the activities of man. Soil erosion in Washington County is most commonly caused by water and can be classified as *sheet erosion* (the removal of soil material without the development of conspicuous channels), *rill erosion* (which produces small channels), and *gully erosion* (which produces large channels).

Soil horizon. A layer of soil, approximately parallel to the surface, having characteristics produced by soil-forming processes and differing in one or more ways from adjacent horizons in the same soil profile.

A horizon. The master horizon, consisting of (1) one or more mineral horizons of maximum organic accumulation; or (2) surface or subsurface horizons that are lighter in color than the underlying horizon and have lost clay minerals, iron, and aluminum, with resultant concentration of the more resistant minerals; or (3) horizons belonging to both of these categories.

B horizon. The master horizon of altered material characterized by (1) an accumulation of clay, iron, or aluminum, with accessory organic matter; or (2) blocky or prismatic structure together with other characteristics, such as stronger colors, unlike those of the A horizon or the underlying horizons of nearly unchanged material; or (3) characteristics of both these categories. Commonly, the lower limit of the B horizon corresponds with the lower limit of the solum.

C horizon. A layer of unconsolidated material, relatively little affected by organisms and presumed to be similar in chemical, physical, and mineralogical composition to the material from which at least a portion of the solum has developed.

D horizon. Any stratum underlying the C horizon, or the B if no C is present, which is unlike the C or unlike the material from which the solum has been formed.

Any major horizon (A, B, C, or D) may or may not consist of two or more subdivisions or subhorizons, and each subhorizon in turn may or may not have subdivisions. For the kinds of subdivisions that may exist, along with their designations and definitions, the reader is referred to the Soil Survey Manual.

Soil permeability. That quality of a soil that enables it to transmit water or air.

Soil profile. A vertical section of the soil through all horizons and extending into the parent material. (See also Parent material; Soil horizon.)

Soil series. A group of soils having the same profile characteristics, and the same general range in color, structure, consistence, and sequence of horizons; the same general conditions of relief and drainage; and generally a common or similar origin and mode of formation.

Soil structure. The arrangement of the individual soil particles into aggregates that have definite shape and pattern. Common kinds of structure in Washington County are *single grain, crumb, granular, blocky, subangular blocky, platy,* and *massive.*

Soil texture. The relative proportions of sand, silt, and clay particles in the soil. A coarse-textured soil is one high in sand; a fine-textured soil contains a large proportion of clay. (See Sand; Silt; Clay.)

Soil type. A subdivision of the soil series based on the texture of the surface soil; for example, in the Huntington series in Washington County there are 3 types—Huntington fine sandy loam, Huntington gravelly loam, and Huntington silt loam.

Sols Bruns Acides. A great soil group in which the soils are characterized by a weak A_1 horizon, a very weak A_2 horizon or none, and a B horizon that is differentiated almost entirely by color; no significant increase in clay minerals in the B horizon as compared to the A horizon; little structural development; low degree of base saturation and very strong acidity.

Solum. The genetic soil developed by soil-forming processes; the A and B horizons; does not include the parent material (C horizon).

Stony. Containing enough stones more than 10 inches in diameter to interfere with, but not prevent, cultivation of intertilled crops. A *very stony* soil contains enough stones to make tillage impractical and to bar the use of farm machinery.

Subgrade (engineering). The substratum, either in-place or fill material, prepared for highway construction; does not include stabilized base course or actual paving materials.

Subgrade modulus (engineering). The resistance of the soil to unit areas displacement under load, expressed in pounds per square inch. Hence, if a load of 1,000 pounds on 100 square inches of surface penetrates 1 inch, the modulus is 10.

Subsoil. Technically, the B horizon of a soil; in more general terms, that part of the soil profile below plow depth.

Substratum. Any layer beneath the B horizon; may be a conforming (C) horizon or an unconforming (D) horizon.

Surface soil. That part of the upper profile, to a depth of about 8 inches, normally disturbed by plowing; more technically, the A horizon.

Terrace (geological). An old alluvial plain, commonly flat or smooth but in some places sloping and dissected, bordering a stream, a lake, or the sea; frequently called a second bottom, as contrasted to the present flood plain; seldom subject to overflow.

Undifferentiated mapping unit. A soil mapping unit that consists of two or more soils or land types that are not ordinarily geographically associated.

Unified soil classification system (engineering). The system of mechanical soil classification of the Corps of Engineers, Department of the Army. Used by the Soil Conservation Service, The Bureau of Reclamation, and other agencies and organizations in works dealing with soils engineering.

Upland (geological). Land consisting of materials unworked by water in recent geological time and ordinarily lying at higher elevations than the alluvial plains and the terraces.

Well graded (engineering). A soil consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction.

GUIDE TO MAPPING UNITS

[See table 4, p. 9, for the approximate acreage and proportionate extent of the soils, and table 5, p. 54, for estimated average acre yields. To learn about use of the soils for woodland, see the section beginning on p. 81; for information about the engineering uses of the soils, including use for irrigation and for sewage disposal, see the section beginning on p. 84. Dashes indicate soil not suitable for irrigation]

Map symbol	*Mapping unit*	*Page*	*Capability unit*	*Page*	*Irrigation soil group*	*Page*	*Woodland suitability group*	*Page*	*Sewage disposal group*	*Page*
AsB	Ashton fine sandy loam, 0 to 5 percent slopes	13	I–6	65	1	114	F1	82	8	121
At	Atkins silt loam	14	IIIw–1	74	----	----	F1	82	8	121
BaA	Benevola clay loam, 0 to 3 percent slopes	15	IIs–1	69	7	117	F1	82	1	117
BaB2	Benevola clay loam, 3 to 8 percent slopes, moderately eroded.	15	IIe–19	68	7	117	F1	82	1	117
BaC2	Benevola clay loam, 8 to 15 percent slopes, moderately eroded.	15	IIIe–30	73	7	117	F1	82	2	118
BaC3	Benevola clay loam, 8 to 15 percent slopes, severely eroded.	15	IVe–1	75	----	----	F1	82	2	118
BcB2	Berks channery loam, ridges, 0 to 10 percent slopes, moderately eroded.	15	IIs–7	70	4	114	F2	83	4	119
BcC2	Berks channery loam, ridges, 10 to 20 percent slopes, moderately eroded.	15	IIIe–32	73	4	114	F2	83	5	120
BcC3	Berks channery loam, ridges, 10 to 20 percent slopes, severely eroded.	15	IVe–32	77	----	----	F2	83	5	120
BcD2	Berks channery loam, ridges, 20 to 30 percent slopes, moderately eroded.	15	IVe–32	77	----	----	F2	83	6	120
BeB	Berks shaly silt loam, 0 to 8 percent slopes	15	IIIs–2	74	4	114	F2	83	4	119
BeB2	Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded.	16	IIIs–2	74	4	114	F2	83	4	119
BeC2	Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded.	16	IVe–32	77	4	114	F2	83	5	120
BeD2	Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded.	16	VIe–3	78	----	----	F2	83	6	120
BkB2	Berks silt loam, ridges, 0 to 10 percent slopes, moderately eroded.	16	IIs–7	70	4	114	F2	83	4	119
BkC2	Berks silt loam, ridges, 10 to 20 percent slopes, moderately eroded.	16	IIIe–32	73	4	114	F2	83	5	120
BkC3	Berks silt loam, ridges, 10 to 20 percent slopes, severely eroded.	16	IVe–32	77	----	----	F2	83	5	120
BkD2	Berks silt loam, ridges, 20 to 30 percent slopes, moderately eroded.	16	IVe–32	77	----	----	F2	83	6	120
BoE3	Berks soils, ridges, 20 to 45 percent slopes, severely eroded.	16	VIIe–3	80	----	----	F2	83	6	120
BoF	Berks soils, ridges, 30 to 60 percent slopes	16	VIIe–3	80	----	----	F3	83	6	120
BrB2	Braddock and Thurmont gravelly loams, 3 to 8 percent slopes, moderately eroded.	17	IIe–4	66	5	115	F1	82	1	117
BrC2	Braddock and Thurmont gravelly loams, 8 to 15 percent slopes, moderately eroded.	17	IIIe–4	70	5	115	F1	82	2	118
BrD	Braddock and Thurmont gravelly loams, 15 to 25 percent slopes.	17	IVe–3	75	----	----	F1	82	3	119
BtB	Brinkerton silt loam, 0 to 8 percent slopes	17	IIIw–1	74	----	----	F1	82	7	120
BuA	Buchanan gravelly loam, 0 to 3 percent slopes	18	IIw–1	68	2	114	F2	83	7	120
BuB2	Buchanan gravelly loam, 3 to 8 percent slopes, moderately eroded.	18	IIe–13	67	2	114	F2	83	7	120
BuC2	Buchanan gravelly loam, 8 to 15 percent slopes, moderately eroded.	18	IIIe–13	72	2	114	F2	83	7	120
BuD2	Buchanan gravelly loam, 15 to 25 percent slopes, moderately eroded.	18	IVe–9	76	----	----	F2	83	7	120
CaB2	Calvin channery fine sandy loam, 3 to 10 percent slopes, moderately eroded.	18	IIe–10	67	1	114	F2	83	4	119
CcB2	Calvin channery loam, 3 to 10 percent slopes, moderately eroded.	19	IIe–10	67	4	114	F2	83	4	119
CcC2	Calvin channery loam, 10 to 20 percent slopes, moderately eroded.	19	IIIe–10	71	4	114	F2	83	5	120
CcD	Calvin channery loam, 20 to 30 percent slopes	19	IVe–10	76	----	----	F2	83	6	120
CcD2	Calvin channery loam, 20 to 30 percent slopes, moderately eroded.	19	IVe–10	76	----	----	F2	83	6	120
CcE	Calvin channery loam, 30 to 45 percent slopes	19	VIe–3	78	----	----	F2	83	6	120
CcF	Calvin channery loam, 45 to 60 percent slopes	19	VIIe–3	80	----	----	F2	83	6	120
CmB2	Calvin shaly loam, 0 to 10 percent slopes, moderately eroded.	19	IIIs–2	74	4	114	F2	83	4	119
CmC2	Calvin shaly loam, 10 to 20 percent slopes, moderately eroded.	19	IVe–32	77	4	114	F2	83	5	120
CmC3	Calvin shaly loam, 10 to 20 percent slopes, severely eroded.	19	VIe–3	78	----	----	F2	83	5	120
CmD	Calvin shaly loam, 20 to 30 percent slopes	19	VIe–3	78	----	----	F2	83	6	120
CmE	Calvin shaly loam, 30 to 45 percent slopes	19	VIIe–3	80	----	----	F2	83	6	120
CnB2	Calvin-Berks channery loams, 0 to 10 percent slopes, moderately eroded.	19	IIs–7	70	4	114	F2	83	4	119

GUIDE TO MAPPING UNITS—Continued

Map symbol	*Mapping unit*	*Page*	*Capability unit*	*Page*	*Irrigation soil group*	*Page*	*Woodland suitability group*	*Page*	*Sewage disposal group*	*Page*
CnC2	Calvin-Berks channery loams, 10 to 20 percent slopes, moderately eroded.	19	IIIe–32	73	4	114	F2	83	5	120
CnC3	Calvin-Berks channery loams, 3 to 20 percent slopes, severely eroded.	19	IVe–32	77	----	----	F2	83	5	120
CnD2	Calvin-Berks channery loams, 20 to 30 percent slopes, moderately eroded.	19	IVe–32	77	----	----	F2	83	6	120
CnF2	Calvin-Berks channery loams, 30 to 60 percent slopes, moderately eroded.	19	VIIe–3	80	----	----	F2	83	6	120
CoB2	Calvin-Montevallo shaly loams, 0 to 10 percent slopes, moderately eroded.	19	IIIs–2	74	4	114	F3	83	4	119
CoC2	Calvin-Montevallo shaly loams, 10 to 20 percent slopes, moderately eroded.	19	IVe–32	77	4	114	F3	83	5	120
CoD2	Calvin-Montevallo shaly loams, 20 to 30 percent slopes, moderately eroded.	19	VIe–3	78	----	----	F3	83	6	120
CoE3	Calvin-Montevallo shaly loams, 20 to 45 percent slopes, severely eroded.	20	VIIe–3	80	----	----	F3	83	6	120
CoF	Calvin-Montevallo shaly loams, 30 to 60 percent slopes.	20	VIIe–3	80	----	----	F3	83	6	120
CrB	Chandler silt loam and channery silt loam, 0 to 10 percent slopes.	20	IIe–10	67	4	114	F2	83	4	119
CrB2	Chandler silt loam and channery silt loam, 3 to 10 percent slopes, moderately eroded.	20	IIe–10	67	4	114	F2	83	4	119
CrC2	Chandler silt loam and channery silt loam, 10 to 20 percent slopes, moderately eroded.	20	IVe–10	76	----	----	F2	83	5	120
CrD	Chandler silt loam and channery silt loam, 20 to 30 percent slopes.	20	VIe–3	78	----	----	F2	83	6	120
Cs	Chewacla gravelly sandy loam	21	IIw–7	69	1	114	F1	82	8	121
Ct	Chewacla silt loam	21	IIw–7	69	3	114	F1	82	8	121
Cu	Chewacla stony silt loam	21	Vs–2	77	----	----	F1	82	8	121
Cv	Congaree silt loam and gravelly loam	21	I–6	65	3	114	F1	82	8	121
CwA	Corydon clay loam, 0 to 3 percent slopes	22	IIIs–2	74	7	117	F2	83	4	119
CwB2	Corydon clay loam, 3 to 8 percent slopes, moderately eroded.	22	IIIe–30	73	7	117	F2	83	4	119
CwC2	Corydon clay loam, 8 to 15 percent slopes, moderately eroded.	22	IVe–1	75	7	117	F2	83	5	120
CxC	Corydon extremely rocky clay loam, 0 to 15 percent slopes.	22	VIIs–1	80	----	----	F2	83	5	120
CyE2	Corydon very rocky clay loam, 3 to 45 percent slopes, moderately eroded.	22	VIs–1	79	----	----	F2	83	6	120
DeD	Dekalb and Leetonia very stony sandy loams, 0 to 25 percent slopes.	22	VIIs–2	80	----	----	F4	83	3	119
DeE	Dekalb and Leetonia very stony sandy loams, 25 to 45 percent slopes.	22	VIIs–2	80	----	----	F4	83	3	119
DeF	Dekalb and Leetonia very stony sandy loams, 45 to 60 percent slopes.	23	VIIs–2	80	----	----	F4	83	3	119
DkD	Dekalb and Lehew very stony loams, 0 to 25 percent slopes.	23	VIIs–2	80	----	----	F3	83	3	119
DkE	Dekalb and Lehew very stony loams, 25 to 45 percent slopes.	23	VIIs–2	80	----	----	F3	83	3	119
DmA	Duffield silt loam, 0 to 3 percent slopes	23	I–1	64	5	115	F1	82	1	117
DmB2	Duffield silt loam, 3 to 8 percent slopes, moderately eroded.	23	IIe–1	65	5	115	F1	82	1	117
DmC2	Duffield silt loam, 8 to 15 percent slopes, moderately eroded.	23	IIIe–1	70	5	115	F1	82	2	118
DmD2	Duffield silt loam, 15 to 25 percent slopes, moderately eroded.	24	IVe–1	75	----	----	F1	82	3	119
DmD3	Duffield silt loam, 8 to 25 percent slopes, severely eroded.	23	IVe–1	75	----	----	F1	82	2	118
DuC	Duffield extremely rocky silt loam, 0 to 15 percent slopes.	23	VIIs–1	80	----	----	F1	82	2	118
DvC	Duffield very rocky silt loam, 3 to 15 percent slopes.	24	VIs–1	79	----	----	F1	82	2	118
DvE2	Duffield very rocky silt loam, 8 to 45 percent slopes, moderately eroded.	24	VIs–1	79	----	----	F1	82	3	119
DyB2	Dunmore cherty silt loam, 3 to 8 percent slopes, moderately eroded.	24	IIe–1	65	6	116	F1	82	4	119
DyC2	Dunmore cherty silt loam, 8 to 15 percent slopes, moderately eroded.	24	IIIe–1	70	6	116	F1	82	5	120
Dz	Dunning and Melvin silty clay loams	25	VIw–1	79	----	----	F1	82	8	121
EdC	Edgemont and Laidig channery loams, 0 to 12 percent slopes.	25	IIe–4	66	5	115	F1	82	1	117
EdD2	Edgemont and Laidig channery loams, 5 to 20 percent slopes, moderately eroded.	25	IIIe–4	70	5	115	F1	82	2	118
EdE2	Edgemont and Laidig channery loams, 20 to 35 percent slopes, moderately eroded.	26	IVe–3	75	----	----	F1	82	3	119
EdF2	Edgemont and Laidig channery loams, 35 to 60 percent slopes, moderately eroded.	26	VIe–2	78	----	----	F1	82	3	119

GUIDE TO MAPPING UNITS—Continued

Map symbol	*Mapping unit*	*Page*	*Capability unit*	*Page*	*Irrigation soil group*	*Page*	*Woodland suitability group*	*Page*	*Sewage disposal group*	*Page*
EgA	Edgemont and Laidig very stony loams, 0 to 5 percent slopes.	26	Vs–2	77	----	----	F1	82	1	117
EgD	Edgemont and Laidig very stony loams, 5 to 35 percent slopes.	26	VIs–2	79	----	----	F1	82	----	----
EgF	Edgemont and Laidig very stony loams, 35 to 60 percent slopes.	26	VIIs–2	80	----	----	F1	82	----	----
EhB2	Elliber cherty loam, 5 to 12 percent slopes, moderately eroded.	26	IIe–26	68	5	115	F1	82	2	118
EhD2	Elliber cherty loam, 12 to 25 percent slopes, moderately eroded.	26	IIIe–26	72	5	115	F1	82	----	----
EhE2	Elliber cherty loam, 25 to 45 percent slopes, moderately eroded.	26	VIe–1	78	----	----	F1	82	----	----
EhF	Elliber cherty loam, 45 to 55 percent slopes	26	VIIe–1	79	----	----	F1	82	----	----
Em	Eroded land, greenstone materials	27	VIIe–2	80	----	----	F4	83	----	----
En	Eroded land, limestone materials	27	VIIe–1	79	----	----	F4	83	----	----
Er	Eroded land, sandstone and quartzite materials	27	VIIe–2	80	----	----	F4	83	----	----
Es	Eroded land, shale and schist materials	27	VIIe–3	80	----	----	F4	83	6	120
EtA	Etowah gravelly loam, 0 to 3 percent slopes	27	I–1	64	5	115	F1	82	1	117
EtB2	Etowah gravelly loam, 3 to 8 percent slopes, moderately eroded.	27	IIe–1	65	5	115	F1	82	1	117
EtC2	Etowah gravelly loam, 8 to 15 percent slopes, moderately eroded.	27	IIIe–1	70	5	115	F1	82	2	118
EtD2	Etowah gravelly loam, 15 to 25 percent slopes, moderately eroded.	28	IVe–1	75	----	----	F1	82	----	----
EwA	Etowah silt loam, 0 to 3 percent slopes	28	I–1	64	5	115	F1	82	1	117
EwB2	Etowah silt loam, 3 to 8 percent slopes, moderately eroded.	28	IIe–1	65	5	115	F1	82	1	117
EwC2	Etowah silt loam, 8 to 15 percent slopes, moderately eroded.	28	IIIe–1	70	5	115	F1	82	2	118
FaB	Fauquier channery loam, 0 to 5 percent slopes	28	I–4	64	5	115	F1	82	1	117
FaB2	Fauquier channery loam, 5 to 10 percent slopes, moderately eroded.	28	IIe–4	66	5	115	F1	82	1	117
FaC2	Fauquier channery loam, 10 to 20 percent slopes, moderately eroded.	28	IIIe–4	70	5	115	F1	82	2	118
FaE2	Fauquier channery loam, 20 to 35 percent slopes, moderately eroded.	28	IVe–3	75	----	----	F1	82	----	----
FrE	Fauquier very stony loam, 5 to 35 percent slopes	29	VIs–2	79	----	----	F1	82	----	----
FsA	Fauquier silt loam, 0 to 3 percent slopes	29	I–4	64	5	115	F1	82	1	117
FsB2	Fauquier silt loam, 3 to 10 percent slopes, moderately eroded.	29	IIe–4	66	5	115	F1	82	1	117
FsC2	Fauquier silt loam, 10 to 20 percent slopes, moderately eroded.	29	IIIe–4	70	5	115	F1	82	2	118
FtC2	Fauquier silt loam, shallow, 3 to 20 percent slopes, moderately eroded.	29	IVe–3	75	----	----	F2	83	5	120
FuD	Frankstown extremely rocky silt loam, 0 to 25 percent slopes.	29	VIIs–1	80	----	----	F1	82	3	119
FuE	Frankstown extremely rocky silt loam, 25 to 45 percent slopes.	29	VIIs–1	80	----	----	F1	82	3	119
FvC2	Frankstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded.	29	VIs–1	79	----	----	F1	82	2	118
FvC3	Frankstown very rocky silt loam, 8 to 15 percent slopes, severely eroded.	29	VIIs–1	80	----	----	F1	82	2	118
FvE2	Frankstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded.	29	VIs–1	79	----	----	F1	82	3	119
FwA	Frankstown and Duffield channery silt loams, 0 to 3 percent slopes.	30	I–1	64	5	115	F1	82	1	117
FwB2	Frankstown and Duffield channery silt loams, 3 to 8 percent slopes, moderately eroded.	30	IIe–1	65	5	115	F1	82	1	117
FwB3	Frankstown and Duffield channery silt loams, 0 to 8 percent slopes, severely eroded.	30	IIIe–30	73	----	----	F1	82	1	117
FwC2	Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, moderately eroded.	30	IIIe–1	70	5	115	F1	82	2	118
FwC3	Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, severely eroded.	30	IVe–1	75	----	----	F1	82	2	118
FwD2	Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, moderately eroded.	30	IVe–1	75	----	----	F1	82	3	119
FwD3	Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, severely eroded.	30	VIe–1	78	----	----	F1	82	3	119
FwE2	Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, moderately eroded.	30	VIe–1	78	----	----	F1	82	3	119
FwE3	Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, severely eroded.	30	VIIe–1	79	----	----	F1	82	3	119
FyB2	Frederick cherty silt loam, 0 to 8 percent slopes, moderately eroded.	31	IIe–26	68	5	115	F1	82	1	117
FyC2	Frederick cherty silt loam, 8 to 15 percent slopes, moderately eroded.	31	IIIe–26	72	5	115	F1	82	2	118

GUIDE TO MAPPING UNITS—Continued

Map symbol	*Mapping unit*	*Page*	*Capability unit*	*Page*	*Irrigation soil group*	*Page*	*Woodland suitability group*	*Page*	*Sewage disposal group*	*Page*
FyC3	Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded.	31	IVe–26	76	--------	----	F1	82	2	118
FyD2	Frederick cherty silt loam, 15 to 25 percent slopes, moderately eroded.	31	IVe–26	76	--------	----	F1	82	3	119
FyD3	Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded.	31	VIe–1	78	--------	----	F1	82	3	119
FyE2	Frederick cherty silt loam, 25 to 45 percent slopes, moderately eroded.	31	VIe–1	78	--------	----	F1	82	3	119
HaA	Hagerstown clay loam, 0 to 3 percent slopes----	31	IIs–1	69	7	117	F1	82	1	117
HaB2	Hagerstown clay loam, 0 to 8 percent slopes moderately eroded.	32	IIe–19	68	7	117	F1	82	1	117
HaB3	Hagerstown clay loam, 3 to 8 percent slopes, severely eroded.	32	IIIe–30	73	--------	----	F1	82	1	117
HaC2	Hagerstown clay loam, 8 to 15 percent slopes, moderately eroded.	32	IIIe–30	73	7	117	F1	82	2	118
HaC3	Hagerstown clay loam, 8 to 15 percent slopes, severely eroded.	32	IVe–1	75	--------	----	F1	82	2	118
HaD2	Hagerstown clay loam, 15 to 25 percent slopes, moderately eroded.	32	IVe–1	75	--------	----	F1	82	3	119
HaD3	Hagerstown clay loam, 15 to 25 percent slopes, severely eroded.	32	VIe–1	78	--------	----	F1	82	3	119
HbD2	Hagerstown extremely rocky silt loam, 0 to 25 percent slopes, moderately eroded.	32	VIIs–1	80	--------	----	F1	82	3	119
HcD2	Hagerstown extremely rocky silty clay loam, 0 to 25 percent slopes, moderately eroded.	32	VIIs–1	80	--------	----	F1	82	3	119
HdE	Hagerstown extremely rocky soils, 25 to 45 percent slopes.	32	VIIs–1	80	--------	----	F2	83	3	119
HeA	Hagerstown silt loam, 0 to 3 percent slopes----	32	I–1	64	5	115	F1	82	1	117
HeB2	Hagerstown silt loam, 0 to 8 percent slopes, moderately eroded.	32	IIe–1	65	5	115	F1	82	1	117
HeC2	Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded.	32	IIIe–1	70	5	115	F1	82	2	118
HeD2	Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded.	32	IVe–1	75	--------	----	F1	82	3	119
HfA	Hagerstown silty clay loam, 0 to 3 percent slopes.	32	I–1	64	7	117	F1	82	1	117
HfB2	Hagerstown silty clay loam, 0 to 8 percent slopes, moderately eroded.	32	IIe–1	65	7	117	F1	82	1	117
HfC2	Hagerstown silty clay loam, 8 to 15 percent slopes, moderately eroded.	32	IIIe–1	70	7	117	F1	82	2	118
HfD2	Hagerstown silty clay loam, 15 to 25 percent slopes, moderately eroded.	32	IVe–1	75	--------	----	F1	82	3	119
HgC2	Hagerstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded.	32	VIs–1	79	--------	----	F1	82	2	118
HgE2	Hagerstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded.	32	VIs–1	79	--------	----	F1	82	3	119
HhC2	Hagerstown very rocky silty clay loam, 3 to 15 percent slopes, moderately eroded.	33	VIs–1	79	--------	----	F1	82	2	118
HhC3	Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded.	33	VIIs–1	80	--------	----	F1	82	2	118
HhE2	Hagerstown very rocky silty clay loam, 15 to 45 percent slopes, moderately eroded.	33	VIs–1	79	--------	----	F1	82	3	119
HkF	Hagerstown very rocky soils, 45 to 55 percent slopes.	33	VIIs–1	80	--------	----	F2	83	3	119
HlA	Hagerstown, Corydon, and Duffield very rocky silt loams, 0 to 3 percent slopes.	33	Vs–1	77	--------	----	F1	82	1	117
HmE2	Hagerstown and Duffield silt loams, 25 to 45 percent slopes, moderately eroded.	33	VIe–1	78	--------	----	F1	82	3	119
HnB2	Hazel channery silt loam, 0 to 10 percent slopes, moderately eroded.	33	IIIs–2	74	4	114	F3	83	5	120
HnC2	Hazel channery silt loam, 10 to 20 percent slopes, moderately eroded.	33	IVe–32	77	--------	----	F3	83	6	120
HnC3	Hazel channery silt loam, 10 to 20 percent slopes, severely eroded.	33	VIe–3	78	--------	----	F3	83	6	120
HnD2	Hazel channery silt loam, 20 to 30 percent slopes, moderately eroded.	33	VIe–3	78	--------	----	F3	83	6	120
HnD3	Hazel channery silt loam, 20 to 30 percent slopes, severely eroded.	33	VIIe–3	80	--------	----	F3	83	6	120
HnE	Hazel channery silt loam, 30 to 45 percent slopes-	34	VIIe–3	80	--------	----	F3	83	6	120
HoB	Highfield gravelly loam, 0 to 5 percent slopes---	34	I–4	64	5	115	F1	82	1	117
HoB2	Highfield gravelly loam, 5 to 10 percent slopes, moderately eroded.	34	IIe–4	66	5	115	F1	82	1	117
HoC2	Highfield gravelly loam, 10 to 20 percent slopes, moderately eroded.	34	IIIe–4	70	5	115	F1	82	2	118
HoE2	Highfield gravelly loam, 20 to 35 percent slopes, moderately eroded.	34	IVe–3	75	--------	----	F1	82	3	119

GUIDE TO MAPPING UNITS—Continued

Map symbol	*Mapping unit*	*Page*	*Capability unit*	*Page*	*Irrigation soil group*	*Page*	*Woodland suitability group*	*Page*	*Sewage disposal group*	*Page*
HoB	Highfield very stony loam, 0 to 5 percent slopes	34	Vs–2	77	--------	----	F1	82	1	117
HpD	Highfield very stony loam, 5 to 30 percent slopes.	34	VIs–2	79	--------	----	F1	82	3	119
HpE	Highfield very stony loam, 30 to 45 percent slopes.	34	VIIs–2	80	--------	----	F1	82	3	119
HrA	Holston gravelly loam, 0 to 3 percent slopes	35	I–4	64	5	115	F1	82	1	117
HrB2	Holston gravelly loam, 0 to 8 percent slopes, moderately eroded.	35	IIe–4	66	5	115	F1	82	1	117
HrC2	Holston gravelly loam, 8 to 15 percent slopes, moderately eroded.	35	IIIe–4	70	5	115	F1	82	2	118
HrD2	Holston gravelly loam, 15 to 25 percent slopes, moderately eroded.	35	IVe–3	75	--------	----	F1	82	3	119
HrD3	Holston gravelly loam, 8 to 25 percent slopes, severely eroded.	35	VIe–2	78	--------	----	F1	82	3	119
HrE2	Holston gravelly loam, 25 to 45 percent slopes, moderately eroded.	35	VIe–2	78	--------	----	F1	82	3	119
HsB	Holston gravelly sandy loam, 3 to 8 percent slopes.	35	IIs–2	69	1	114	F1	82	1	117
HsC2	Holston gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.	35	IIIe–5	71	1	114	F1	82	1	117
HsC3	Holston gravelly sandy loam, 8 to 15 percent slopes, severely eroded.	35	IVe–5	76	--------	----	F1	82	2	118
HtA	Holston silt loam, 0 to 3 percent slopes	35	I–4	64	5	115	F1	82	1	117
HtB2	Holston silt loam, 3 to 8 percent slopes, moderately eroded.	35	IIe–4	66	5	115	F1	82	1	117
HtC2	Holston silt loam, 8 to 15 percent slopes, moderately eroded.	35	IIIe–4	70	5	115	F1	82	2	118
Hu	Huntington fine sandy loam	36	I–6	65	1	114	F1	82	8	121
Hv	Huntington gravelly loam	36	I–6	65	3	114	F1	82	8	121
Hw	Huntington silt loam	36	I–6	65	3	114	F1	82	8	121
Hx	Huntington silt loam, local alluvium	36	I–6	65	3	114	F1	82	8	121
LaA	Laidig gravelly loam, 0 to 3 percent slopes	37	I–4	64	5	115	F1	82	1	117
LaB2	Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded.	37	IIe–4	66	5	115	F1	82	1	117
LaC2	Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded.	37	IIIe–4	70	5	115	F1	82	2	118
LaD2	Laidig gravelly loam, 15 to 25 percent slopes, moderately eroded.	37	IVe–3	75	--------	----	F1	82	3	119
LbD	Laidig very stony loam, 8 to 25 percent slopes	37	VIs–2	79	--------	----	F1	82	3	119
LbE2	Laidig very stony loam, 15 to 45 percent slopes, moderately eroded.	37	VIIs–2	80	--------	----	F1	82	3	119
LcB2	Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded.	37	IIe–13	67	2	114	F2	83	7	120
LcD2	Landisburg cherty silt loam, 8 to 25 percent slopes, moderately eroded.	37	IIIe–13	72	2	114	F2	83	7	120
Le	Largent silt loam	38	IIw–7	69	3	114	F1	82	8	121
LgA	Leadvale gravelly silt loam, 0 to 3 percent slopes	38	IIw–1	68	2	114	F2	83	7	120
LgB2	Leadvale gravelly silt loam, 3 to 8 percent slopes, moderately eroded.	38	IIe–13	67	2	114	F2	83	7	120
Lm	Lindside silt loam	40	IIw–7	69	3	114	F1	82	8	121
Ln	Lindside silt loam, local alluvium	40	IIw–7	69	3	114	F1	82	8	121
LoB2	Litz channery loam, 3 to 10 percent slopes, moderately eroded.	40	IIe–11	67	4	114	F3	83	4	119
LoC2	Litz channery loam, 10 to 20 percent slopes, moderately eroded.	40	IIIe–31	73	4	114	F3	83	5	120
LoC3	Litz channery loam, 10 to 20 percent slopes, severely eroded.	40	IVe–31	77	--------	----	F3	83	5	120
LsB	Litz shaly loam, 0 to 10 percent slopes	40	IIIe–31	73	4	114	F3	83	4	119
LsB2	Litz shaly loam, 3 to 10 percent slopes, moderately eroded.	40	IIIe–31	73	4	114	F3	83	4	119
LsC2	Litz shaly loam, 10 to 20 percent slopes, moderately eroded.	40	IVe–31	77	4	114	F3	83	5	120
LsC3	Litz shaly loam, 10 to 20 percent slopes, severely eroded.	40	VIe–3	78	--------	----	F3	83	5	120
LsD2	Litz shaly loam, 20 to 30 percent slopes, moderately eroded.	40	VIe–3	78	--------	----	F3	83	6	120
LsD3	Litz shaly loam, 20 to 30 percent slopes, severely eroded.	40	VIIe–3	80	--------	----	F3	83	6	120
LsE2	Litz shaly loam, 30 to 45 percent slopes, moderately eroded.	40	VIIe–3	80	--------	----	F3	83	6	120
LsE3	Litz shaly loam, 30 to 45 percent slopes, severely eroded.	40	VIIe–3	80	--------	----	F3	83	6	120
LsF	Litz shaly loam, 45 to 60 percent slopes	41	VIIe–3	80	--------	----	F3	83	6	120
LtB	Litz-Teas channery silt loams, 0 to 8 percent slopes.	41	IIe–11	67	4	114	F3	83	4	119
LtC2	Litz-Teas channery silt loams, 3 to 15 percent slopes, moderately eroded.	41	IIIe–31	73	--------	----	F3	83	5	120

GUIDE TO MAPPING UNITS—Continued

Map symbol	*Mapping unit*	*Page*	*Capability unit*	*Page*	*Irrigation soil group*	*Page*	*Woodland suitability group*	*Page*	*Sewage disposal group*	*Page*
LtC3	Litz-Teas channery silt loams, 8 to 15 percent slopes, severely eroded.	41	IVe–31	77	4	114	F3	83	5	120
LtD2	Litz-Teas channery silt loams, 15 to 25 percent slopes, moderately eroded.	41	IVe–31	77	----	----	F3	83	6	120
LtD3	Litz-Teas channery silt loams, 15 to 25 percent slopes, severely eroded.	41	VIe–3	78	----	----	F3	83	6	120
LtE2	Litz-Teas channery silt loams, 25 to 45 percent slopes, moderately eroded.	41	VIe–3	78	----	----	F3	83	6	120
Me	Melvin silt loam	41	IIIw–2	74	----	----	F1	82	8	121
MgB2	Monongahela gravelly loam, 3 to 8 percent slopes, moderately eroded.	42	IIe–13	67	2	114	F2	83	7	120
MgC2	Monongahela gravelly loam, 8 to 15 percent slopes, moderately eroded.	42	IIIe–13	72	2	114	F2	83	7	120
MhA	Monongahela silt loam, 0 to 3 percent slopes	42	IIw–1	68	2	114	F2	83	7	120
MhB2	Monongahela silt loam, 3 to 8 percent slopes, moderately eroded.	42	IIe–13	67	2	114	F2	83	7	120
MhC2	Monongahela silt loam, 8 to 15 percent slopes, moderately eroded.	42	IIIe–13	72	2	114	F2	83	7	120
MhD2	Monongahela silt loam, 15 to 25 percent slopes, moderately eroded.	42	IVe–9	76	----	----	F2	83	7	120
MmB2	Montevallo shaly loam, 0 to 10 percent slopes, moderately eroded.	42	IIIs–2	74	4	114	F3	83	4	119
MmC2	Montevallo shaly loam, 10 to 20 percent slopes, moderately eroded.	42	IVe–32	77	----	----	F3	83	5	120
MmC3	Montevallo shaly loam, 10 to 20 percent slopes, severely eroded.	43	VIe–3	78	----	----	F3	83	6	120
MmD2	Montevallo shaly loam, 20 to 30 percent slopes, moderately eroded.	43	VIe–3	78	----	----	F3	83	6	120
MmD3	Montevallo shaly loam, 20 to 30 percent slopes, severely eroded.	43	VIIe–3	80	----	----	F3	83	6	120
MoA	Murrill gravelly loam, 0 to 3 percent slopes	43	I–4	64	5	115	F1	82	1	117
MoB2	Murrill gravelly loam, 0 to 8 percent slopes, moderately eroded.	43	IIe–4	66	5	115	F1	82	1	117
MoC2	Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded.	43	IIIe–4	70	5	115	F1	82	2	118
MoD2	Murrill gravelly loam, 15 to 25 percent slopes, moderately eroded.	44	IVe–3	75	----	----	F1	82	3	119
MoD3	Murrill gravelly loam, 8 to 25 percent slopes, severely eroded.	43	VIe–2	78	----	----	F1	82	3	119
MoE2	Murrill gravelly loam, 25 to 45 percent slopes, moderately eroded.	44	VIe–2	78	----	----	F1	82	3	119
MrB	Murrill gravelly sandy loam, 0 to 8 percent slopes	44	IIs–2	69	1	114	F1	82	1	117
MrC2	Murrill gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.	44	IIIe–5	71	1	114	F1	82	1	117
MrC3	Murrill gravelly sandy loam, 8 to 15 percent slopes, severely eroded.	44	IVe–5	76	----	----	F1	82	2	118
MrD2	Murrill gravelly sandy loam, 15 to 25 percent slopes, moderately eroded.	44	IVe–5	76	----	----	F1	82	3	119
MrD3	Murrill gravelly sandy loam, 15 to 25 percent slopes, severely eroded.	44	VIe–2	78	----	----	F1	82	3	119
MsA	Murrill silt loam, 0 to 3 percent slopes	44	I–4	64	5	115	F1	82	1	117
MsB2	Murrill silt loam, 0 to 8 percent slopes, moderately eroded.	44	IIe–4	66	5	115	F1	82	1	117
MsC2	Murrill silt loam, 8 to 15 percent slopes, moderately eroded.	44	IIIe–4	70	5	115	F1	82	2	118
MvA	Myersville channery loam, 0 to 3 percent slopes	45	I–4	64	5	115	F1	82	1	117
MvB2	Myersville channery loam, 3 to 10 percent slopes, moderately eroded.	45	IIe–4	66	5	115	F1	82	1	117
MvC2	Myersville channery loam, 10 to 20 percent slopes, moderately eroded.	45	IIIe–4	70	5	115	F1	82	2	118
MvD2	Myersville channery loam, 20 to 30 percent slopes, moderately eroded.	45	IVe–3	75	----	----	F1	82	3	119
MvE2	Myersville channery loam, 30 to 45 percent slopes, moderately eroded.	45	VIe–2	78	----	----	F1	82	3	119
MwB3	Myersville channery silt loam, 3 to 10 percent slopes, severely eroded.	45	IIIe–44	73	----	----	F1	82	1	117
MwD3	Myersville channery silt loam, 10 to 30 percent slopes, severely eroded.	45	VIe–2	78	----	----	F1	82	3	119
MxA	Myersville silt loam, 0 to 3 percent slopes	45	I–4	64	5	115	F1	82	1	117
MxB2	Myersville silt loam, 3 to 10 percent slopes, moderately eroded.	45	IIe–4	66	5	115	F1	82	1	117
MxC2	Myersville silt loam, 10 to 20 percent slopes, moderately eroded.	45	IIIe–4	70	5	115	F1	82	2	118
MyE2	Myersville very stony loam, 3 to 30 percent slopes, moderately eroded.	45	VIs–2	79	----	----	F1	82	3	119
MyF2	Myersville very stony loam, 30 to 55 percent slopes, eroded.	45	VIIs–2	80	----	----	F1	82	3	119

GUIDE TO MAPPING UNITS—Continued

Map symbol	Mapping unit	Page	Capability unit	Page	Irrigation soil group	Page	Woodland suitability group	Page	Sewage disposal group	Page
Pg	Philo gravelly sandy loam	45	IIw–7	69	1	114	F1	82	8	121
Ph	Philo silt loam	46	IIw–7	69	3	114	F1	82	8	121
Pn	Pope fine sandy loam	46	I–6	65	1	114	F1	82	8	121
Po	Pope gravelly loam	46	I–6	65	3	114	F1	82	8	121
Pp	Pope gravelly sandy loam	46	IIs–2	69	1	114	F1	82	8	121
Ps	Pope silt loam	46	I–6	65	3	114	F1	82	8	121
Pt	Pope stony gravelly loam	46	Vs–2	77	----	----	F1	82	8	121
Rk	Rocky eroded land	46	VIIs–1	80	----	----	F4	83	3	119
RoB2	Rohrersville silty clay loam, 0 to 8 percent slopes, moderately eroded.	47	IIIw–1	74	----	----	F1	82	7	120
Sr	Stony rolling land	47	VIIs–2	80	----	----	F4	83	3	119
Ss	Stony steep land	47	VIIIs–1	81	----	----	F4	83	3	119
TaC2	Talladega gravelly silt loam, thick solum variant, 0 to 20 percent slopes, moderately eroded.	47	IIIe–10	71	4	114	F1	82	2	118
TaC3	Talladega gravelly silt loam, thick solum variant, 10 to 20 percent slopes, severely eroded.	48	IVe–10	76	----	----	F1	82	3	119
TaD	Talladega gravelly silt loam, thick solum variant, 20 to 30 percent slopes.	48	IVe–10	76	----	----	F1	82	3	119
TaE2	Talladega gravelly silt loam, thick solum variant, 20 to 45 percent slopes, moderately eroded.	48	VIe–3	78	----	----	F1	82	3	119
Te	Terrace escarpments	48	IIIe–6	71	----	----	F1	82	8	121
ThB2	Thurmont gravelly loam, 3 to 8 percent slopes, moderately eroded.	49	IIe–4	66	5	115	F1	82	1	117
ThC2	Thurmont gravelly loam, 8 to 15 percent slopes, moderately eroded.	49	IIIe–4	70	5	115	F1	82	2	118
TrA	Trego gravelly silt loam, 0 to 3 percent slopes	49	IIw–1	68	2	114	F2	83	7	120
TrC2	Trego gravelly silt loam, 3 to 15 percent slopes, moderately eroded.	49	IIIe–13	72	2	114	F2	83	7	120
TyB	Tyler silt loam, 0 to 8 percent slopes	50	IIIw–1	74	----	----	F2	83	7	120
Wa	Warners loam, 0 to 8 percent slopes	50	IIw–7	69	3	114	F1	82	8	121
WbA	Waynesboro gravelly loam, 0 to 3 percent slopes	51	I–4	64	5	115	F1	82	1	117
WbB2	Waynesboro gravelly loam, 0 to 8 percent slopes, moderately eroded.	51	IIe–4	66	5	115	F1	82	1	117
WbC2	Waynesboro gravelly loam, 8 to 15 percent slopes, moderately eroded.	51	IIIe–4	70	5	115	F1	82	2	118
WbC3	Waynesboro gravelly loam, 3 to 15 percent slopes, severely eroded.	51	IIIe–44	73	----	----	F1	82	2	118
WbD2	Waynesboro gravelly loam, 15 to 25 percent slopes, moderately eroded.	51	IVe–3	75	----	----	F1	82	3	119
WbD3	Waynesboro gravelly loam, 15 to 25 percent slopes, severely eroded.	51	VIe–2	78	----	----	F1	82	3	119
WbE2	Waynesboro gravelly loam, 25 to 45 percent slopes, moderately eroded.	51	VIe–2	78	----	----	F1	82	3	119
WgB	Waynesboro gravelly sandy loam, 0 to 8 percent slopes.	51	IIs–2	69	1	114	F1	82	1	117
WgC2	Waynesboro gravelly sandy loam, 3 to 15 percent slopes, moderately eroded.	51	IIIe–5	71	1	114	F1	82	1	117
WgC3	Waynesboro gravelly sandy loam, 8 to 15 percent slopes, severely eroded.	51	IVe–5	76	----	----	F1	82	2	118
WgD2	Waynesboro gravelly sandy loam, 15 to 25 percent slopes, moderately eroded.	51	IVe–5	76	----	----	F1	82	3	119
Wh	Wehadkee silt loam	52	IIIw–1	74	----	----	F1	82	8	121
WmB2	Westmoreland channery silt loam, 3 to 10 percent slopes, moderately eroded.	52	IIe–1	65	5	115	F1	82	1	117
WmC2	Westmoreland channery silt loam, 10 to 20 percent slopes, moderately eroded.	52	IIIe–1	70	5	115	F1	82	2	118
WmC3	Westmoreland channery silt loam, 3 to 20 percent slopes, severely eroded.	52	IVe–1	75	----	----	F1	82	2	118
WmD2	Westmoreland channery silt loam, 20 to 30 percent slopes, moderately eroded.	52	IVe–1	75	----	----	F1	82	3	119
WmD3	Westmoreland channery silt loam, 20 to 30 percent slopes, severely eroded.	52	VIe–1	78	----	----	F1	82	3	119

Growth Through Agricultural Progress

Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

Nondiscrimination Statement

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for

program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquiries

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).

GENERAL SOIL MAP
WASHINGTON COUNTY, MARYLAND

SOIL ASSOCIATIONS

WELL DRAINED, STONY AND VERY STONY SOILS

1 — Dekalb-Leetonia-Edgemont-Laidig association: Very stony, mountainous soils

2 — Dekalb-Highfield association: Very steep, stony soils

3 — Highfield-Fauquier association: Deep, stony soils

WELL TO EXCESSIVELY DRAINED, SHALLOW, MEDIUM TEXTURED SOILS

4 — Berks-Montevallo association: Soils on shale

5 — Hazel-Chandler association: Shallow soils on schist

6 — Talladega association: Moderately deep soils on schist

7 — Litz-Teas association: Shallow, steep soils on shale

8 — Calvin-Berks-Litz-Montevallo association: Shallow soils on shale, limestone, or sandstone

MODERATELY WELL TO WELL DRAINED, DEEP, MEDIUM TEXTURED SOILS

9 — Holston-Monongahela-Huntington-Lindside association: Soils on broad flood plains and terraces

WELL DRAINED, DEEP, MEDIUM TEXTURED SOILS

10 — Braddock-Thurmont-Edgemont-Laidig association: Gravelly soils

11 — Waynesboro association: Soils on high terraces along the Potomac River

12 — Fauquier-Myersville-Highfield association: Soils on greenstone

13 — Murrill association: Well drained soils on colluvial deposits that contain lime

14 — Hagerstown-Duffield-Frankstown association: Soils of limestone valleys

Scale

1 0 1 2 3 4 Miles

N

78°20′ 78°10′ 78°00′ 77°50′ 77°40′ 77°30′ 39°40′ 39°30′ 39°20′

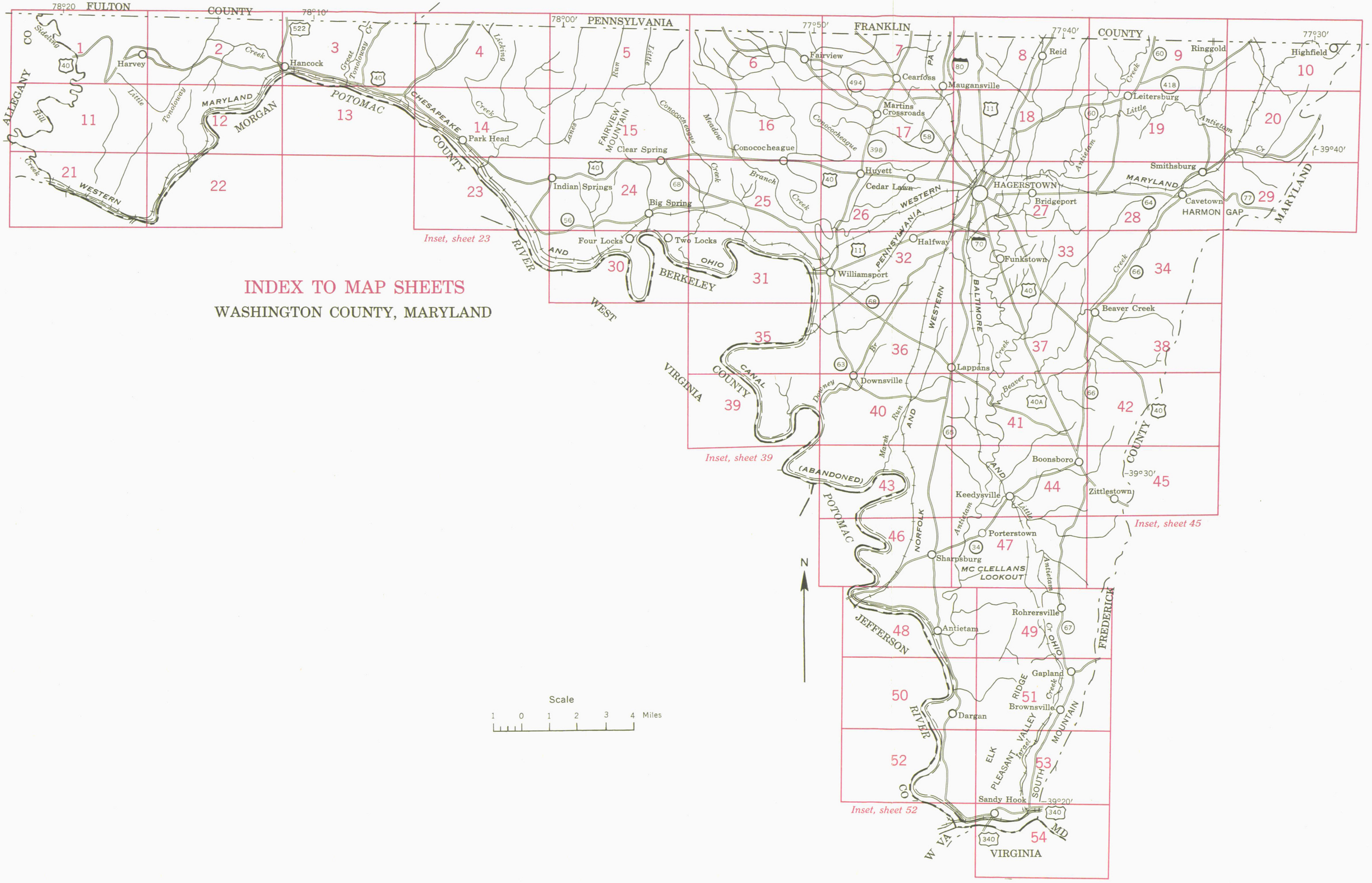
FULTON COUNTY PENNSYLVANIA FRANKLIN COUNTY MARYLAND WEST VIRGINIA ALLEGANY CO MORGAN COUNTY BERKELEY COUNTY JEFFERSON COUNTY FREDERICK COUNTY VIRGINIA

Harvey Hancock Park Head Clear Spring Indian Springs Big Spring Four Locks Two Locks Fairview Cearfoss Martins Crossroads Maugansville Reid Ringgold Highfield Leitersburg Smithsburg Cavetown HARMON GAP Huyett Cedar Lawn Conococheague Halfway HAGERSTOWN Bridgeport Funkstown Williamsport Beaver Creek Lappans Downsville Boonsboro Keedysville Zittlestown Porterstown Sharpsburg MC CLELLANS LOOKOUT Antietam Robersville Gapland Brownsville Dargan Sandy Hook

POTOMAC RIVER CHESAPEAKE AND OHIO CANAL (ABANDONED) FAIRVIEW MOUNTAIN ELK RIDGE PLEASANT VALLEY SOUTH MOUNTAIN NORFOLK WESTERN MARYLAND PENNSYLVANIA BALTIMORE Licking Creek Little Tonoloway Creek Great Tonoloway Cr Fulton Creek Sidehill Creek Little Hill Creek Conococheague Creek Meadow Branch Marsh Run Downey Branch Beaver Creek Antietam Cr Little Antietam Creek Marsh Run

INDEX TO MAP SHEETS

WASHINGTON COUNTY, MARYLAND



SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, E, or F, shows the slope. Symbols without a slope letter are those of nearly level soils, such as Huntington silt loam, or of land types, such as Rocky eroded land, that have a considerable range of slope. A final number, 2 or 3, shows that the soil is eroded.

SYMBOL	NAME
AsB	Ashton fine sandy loam, 0 to 5 percent slopes
At	Atkins silt loam
BaA	Benevola clay loam, 0 to 3 percent slopes
BaB2	Benevola clay loam, 3 to 8 percent slopes, moderately eroded
BaC2	Benevola clay loam, 8 to 15 percent slopes, moderately eroded
BaC3	Benevola clay loam, 8 to 15 percent slopes, severely eroded
BcB2	Berks channery loam, ridges, 0 to 10 percent slopes, moderately eroded
BcC2	Berks channery loam, ridges, 10 to 20 percent slopes, moderately eroded
BcC3	Berks channery loam, ridges, 10 to 20 percent slopes, severely eroded
BcD2	Berks channery loam, ridges, 20 to 30 percent slopes, moderately eroded
BeB	Berks shaly silt loam, 0 to 8 percent slopes
BeB2	Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded
BeC2	Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded
BeD2	Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded
BkB2	Berks silt loam, ridges, 0 to 10 percent slopes, moderately eroded
BkC2	Berks silt loam, ridges, 10 to 20 percent slopes, moderately eroded
BkC3	Berks silt loam, ridges, 10 to 20 percent slopes, severely eroded
BkD2	Berks silt loam, ridges, 20 to 30 percent slopes, moderately eroded
BoE3	Berks soils, ridges, 20 to 45 percent slopes, severely eroded
BoF	Berks soils, ridges, 30 to 60 percent slopes
BrB2	Braddock and Thurmont gravelly loams, 3 to 8 percent slopes, moderately eroded
BrC2	Braddock and Thurmont gravelly loams, 8 to 15 percent slopes, moderately eroded
BrD	Braddock and Thurmont gravelly loams, 15 to 25 percent slopes
BtB	Brinkerton silt loam, 0 to 8 percent slopes
BuA	Buchanan gravelly loam, 0 to 3 percent slopes
BuB2	Buchanan gravelly loam, 3 to 8 percent slopes, moderately eroded
BuC2	Buchanan gravelly loam, 8 to 15 percent slopes, moderately eroded
BuD2	Buchanan gravelly loam, 15 to 25 percent slopes, moderately eroded
CaB2	Calvin channery fine sandy loam, 3 to 10 percent slopes, moderately eroded
CcB2	Calvin channery loam, 3 to 10 percent slopes, moderately eroded
CcC2	Calvin channery loam, 10 to 20 percent slopes, moderately eroded
CcD	Calvin channery loam, 20 to 30 percent slopes
CcD2	Calvin channery loam, 20 to 30 percent slopes, moderately eroded
CcE	Calvin channery loam, 30 to 45 percent slopes
CcF	Calvin channery loam, 45 to 60 percent slopes
CmB2	Calvin shaly loam, 0 to 10 percent slopes, moderately eroded
CmC2	Calvin shaly loam, 10 to 20 percent slopes, moderately eroded
CmC3	Calvin shaly loam, 10 to 20 percent slopes, severely eroded
CmD	Calvin shaly loam, 20 to 30 percent slopes
CmE	Calvin shaly loam, 30 to 45 percent slopes
CnB2	Calvin-Berks channery loams, 0 to 10 percent slopes, moderately eroded
CnC2	Calvin-Berks channery loams, 10 to 20 percent slopes, moderately eroded
CnC3	Calvin-Berks channery loams, 3 to 20 percent slopes, severely eroded
CnD2	Calvin-Berks channery loams, 20 to 30 percent slopes, moderately eroded
CnF2	Calvin-Berks channery loams, 30 to 60 percent slopes, moderately eroded
CoB2	Calvin-Montevallo shaly loams, 0 to 10 percent slopes, moderately eroded
CoC2	Calvin-Montevallo shaly loams, 10 to 20 percent slopes, moderately eroded
CoD2	Calvin-Montevallo shaly loams, 20 to 30 percent slopes, moderately eroded
CoE3	Calvin-Montevallo shaly loams, 20 to 45 percent slopes, severely eroded
CoF	Calvin-Montevallo shaly loams, 30 to 60 percent slopes
CrB	Chandler silt loam and channery silt loam, 0 to 10 percent slopes
CrB2	Chandler silt loam and channery silt loam, 3 to 10 percent slopes, moderately eroded
CrC2	Chandler silt loam and channery silt loam, 10 to 20 percent slopes, moderately eroded
CrD	Chandler silt loam and channery silt loam, 20 to 30 percent slopes
Cs	Chewacla gravelly sandy loam
Ct	Chewacla silt loam
Cu	Chewacla stony silt loam
Cv	Congaree silt loam and gravelly loam
CwA	Corydon clay loam, 0 to 3 percent slopes
CwB2	Corydon clay loam, 3 to 8 percent slopes, moderately eroded
CwC2	Corydon clay loam, 8 to 15 percent slopes, moderately eroded
CxC	Corydon extremely rocky clay loam, 0 to 15 percent slopes
CyE2	Corydon very rocky clay loam, 3 to 45 percent slopes, moderately eroded
DeD	Dekalb and Leetonia very stony sandy loams, 0 to 25 percent slopes
DeE	Dekalb and Leetonia very stony sandy loams, 25 to 45 percent slopes
DeF	Dekalb and Leetonia very stony sandy loams, 45 to 60 percent slopes
DkD	Dekalb and Lehew very stony loams, 0 to 25 percent slopes
DkE	Dekalb and Lehew very stony loams, 25 to 45 percent slopes
DmA	Duffield silt loam, 0 to 3 percent slopes
DmB2	Duffield silt loam, 3 to 8 percent slopes, moderately eroded
DmC2	Duffield silt loam, 8 to 15 percent slopes, moderately eroded
DmD2	Duffield silt loam, 15 to 25 percent slopes, moderately eroded
DmD3	Duffield silt loam, 8 to 25 percent slopes, severely eroded
DuC	Duffield extremely rocky silt loam, 0 to 15 percent slopes
DvC	Duffield very rocky silt loam, 3 to 15 percent slopes
DvE2	Duffield very rocky silt loam, 8 to 45 percent slopes, moderately eroded
DyB2	Dunmore cherty silt loam, 3 to 8 percent slopes, moderately eroded
DyC2	Dunmore cherty silt loam, 8 to 15 percent slopes, moderately eroded
Dz	Dunning and Melvin silty clay loams
EdC	Edgemont and Laidig channery loams, 0 to 12 percent slopes
EdD2	Edgemont and Laidig channery loams, 5 to 20 percent slopes, moderately eroded
EdE2	Edgemont and Laidig channery loams, 20 to 35 percent slopes, moderately eroded
EdF2	Edgemont and Laidig channery loams, 35 to 60 percent slopes, moderately eroded
EgA	Edgemont and Laidig very stony loams, 0 to 5 percent slopes
EgD	Edgemont and Laidig very stony loams, 5 to 35 percent slopes
EgF	Edgemont and Laidig very stony loams, 35 to 60 percent slopes
EhB2	Elliber cherty loam, 5 to 12 percent slopes, moderately eroded
EhD2	Elliber cherty loam, 12 to 25 percent slopes, moderately eroded
EhE2	Elliber cherty loam, 25 to 45 percent slopes, moderately eroded
EhF	Elliber cherty loam, 45 to 55 percent slopes
Em	Eroded land, greenstone materials
En	Eroded land, limestone materials
Er	Eroded land, sandstone and quartzite materials
Es	Eroded land, shale and schist materials
EtA	Etowah gravelly loam, 0 to 3 percent slopes
EtB2	Etowah gravelly loam, 3 to 8 percent slopes, moderately eroded
EtC2	Etowah gravelly loam, 8 to 15 percent slopes, moderately eroded
EtD2	Etowah gravelly loam, 15 to 25 percent slopes, moderately eroded
EwA	Etowah silt loam, 0 to 3 percent slopes
EwB2	Etowah silt loam, 3 to 8 percent slopes, moderately eroded
EwC2	Etowah silt loam, 8 to 15 percent slopes, moderately eroded
FaB	Fauquier channery loam, 0 to 5 percent slopes
FaB2	Fauquier channery loam, 5 to 10 percent slopes, moderately eroded
FaC2	Fauquier channery loam, 10 to 20 percent slopes, moderately eroded
FaE2	Fauquier channery loam, 20 to 35 percent slopes, moderately eroded
FrE	Fauquier very stony loam, 5 to 35 percent slopes
FsA	Fauquier silt loam, 0 to 3 percent slopes
FsB2	Fauquier silt loam, 3 to 10 percent slopes, moderately eroded
FsC2	Fauquier silt loam, 10 to 20 percent slopes, moderately eroded
FtC2	Fauquier silt loam, shallow, 3 to 20 percent slopes, moderately eroded
FuD	Frankstown extremely rocky silt loam, 0 to 25 percent slopes
FuE	Frankstown extremely rocky silt loam, 25 to 45 percent slopes
FvC2	Frankstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded
FvC3	Frankstown very rocky silt loam, 8 to 15 percent slopes, severely eroded
FvE2	Frankstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded
FwA	Frankstown and Duffield channery silt loams, 0 to 3 percent slopes
FwB2	Frankstown and Duffield channery silt loams, 3 to 8 percent slopes, moderately eroded
FwB3	Frankstown and Duffield channery silt loams, 0 to 8 percent slopes, severely eroded
FwC2	Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, moderately eroded
FwC3	Frankstown and Duffield channery silt loams, 8 to 15 percent slopes, severely eroded
FwD2	Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, moderately eroded
FwD3	Frankstown and Duffield channery silt loams, 15 to 25 percent slopes, severely eroded
FwE2	Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, moderately eroded
FwE3	Frankstown and Duffield channery silt loams, 25 to 45 percent slopes, severely eroded
FyB2	Frederick cherty silt loam, 0 to 8 percent slopes, moderately eroded
FyC2	Frederick cherty silt loam, 8 to 15 percent slopes, moderately eroded
FyC3	Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded
FyD2	Frederick cherty silt loam, 15 to 25 percent slopes, moderately eroded
FyD3	Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded
FyE2	Frederick cherty silt loam, 25 to 45 percent slopes, moderately eroded
HaA	Hagerstown clay loam, 0 to 3 percent slopes
HaB2	Hagerstown clay loam, 0 to 8 percent slopes, moderately eroded
HaB3	Hagerstown clay loam, 3 to 8 percent slopes, severely eroded
HaC2	Hagerstown clay loam, 8 to 15 percent slopes, moderately eroded
HaC3	Hagerstown clay loam, 8 to 15 percent slopes, severely eroded
HaD2	Hagerstown clay loam, 15 to 25 percent slopes, moderately eroded
HaD3	Hagerstown clay loam, 15 to 25 percent slopes, severely eroded
HbD2	Hagerstown extremely rocky silt loam, 0 to 25 percent slopes, moderately eroded
HcD2	Hagerstown extremely rocky silty clay loam, 0 to 25 percent slopes, moderately eroded
HdE	Hagerstown extremely rocky soils, 25 to 45 percent slopes
HeA	Hagerstown silt loam, 0 to 3 percent slopes
HeB2	Hagerstown silt loam, 0 to 8 percent slopes, moderately eroded
HeC2	Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded
HeD2	Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded
HfA	Hagerstown silty clay loam, 0 to 3 percent slopes
HfB2	Hagerstown silty clay loam, 0 to 8 percent slopes, moderately eroded
HfC2	Hagerstown silty clay loam, 8 to 15 percent slopes, moderately eroded
HfD2	Hagerstown silty clay loam, 15 to 25 percent slopes, moderately eroded
HgC2	Hagerstown very rocky silt loam, 3 to 15 percent slopes, moderately eroded
HgE2	Hagerstown very rocky silt loam, 15 to 45 percent slopes, moderately eroded
HhC2	Hagerstown very rocky silty clay loam, 3 to 15 percent slopes, moderately eroded
HhC3	Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded
HhE2	Hagerstown very rocky silty clay loam, 15 to 45 percent slopes, moderately eroded
HkF	Hagerstown very rocky soils, 45 to 55 percent slopes
HlA	Hagerstown, Corydon, and Duffield very rocky silt loams, 0 to 3 percent slopes
HmE2	Hagerstown and Duffield silt loams, 25 to 45 percent slopes, moderately eroded
HnB2	Hazel channery silt loam, 0 to 10 percent slopes, moderately eroded
HnC2	Hazel channery silt loam, 10 to 20 percent slopes, moderately eroded
HnC3	Hazel channery silt loam, 10 to 20 percent slopes, severely eroded
HnD2	Hazel channery silt loam, 20 to 30 percent slopes, moderately eroded
HnD3	Hazel channery silt loam, 20 to 30 percent slopes, severely eroded
HnE	Hazel channery silt loam, 30 to 45 percent slopes
HoB	Highfield gravelly loam, 0 to 5 percent slopes
HoB2	Highfield gravelly loam, 5 to 10 percent slopes, moderately eroded
HoC2	Highfield gravelly loam, 10 to 20 percent slopes, moderately eroded
HoE2	Highfield gravelly loam, 20 to 35 percent slopes, moderately eroded
HpB	Highfield very stony loam, 0 to 5 percent slopes
HpD	Highfield very stony loam, 5 to 30 percent slopes
HpE	Highfield very stony loam, 30 to 45 percent slopes
HrA	Holston gravelly loam, 0 to 3 percent slopes
HrB2	Holston gravelly loam, 0 to 8 percent slopes, moderately eroded
HrC2	Holston gravelly loam, 8 to 15 percent slopes, moderately eroded
HrD2	Holston gravelly loam, 15 to 25 percent slopes, moderately eroded
HrD3	Holston gravelly loam, 8 to 25 percent slopes, severely eroded
HrE2	Holston gravelly loam, 25 to 45 percent slopes, moderately eroded
HsB	Holston gravelly sandy loam, 3 to 8 percent slopes
HsC2	Holston gravelly sandy loam, 3 to 15 percent slopes, moderately eroded
HsC3	Holston gravelly sandy loam, 8 to 15 percent slopes, severely eroded
HtA	Holston silt loam, 0 to 3 percent slopes
HtB2	Holston silt loam, 3 to 8 percent slopes, moderately eroded
HtC2	Holston silt loam, 8 to 15 percent slopes, moderately eroded
Hu	Huntington fine sandy loam
Hv	Huntington gravelly loam
Hw	Huntington silt loam
Hx	Huntington silt loam, local alluvium
LaA	Laidig gravelly loam, 0 to 3 percent slopes
LaB2	Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded
LaC2	Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded
LaD2	Laidig gravelly loam, 15 to 25 percent slopes, moderately eroded
LbD	Laidig very stony loam, 8 to 25 percent slopes
LbE2	Laidig very stony loam, 15 to 45 percent slopes, moderately eroded
LcB2	Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded
LcD2	Landisburg cherty silt loam, 8 to 25 percent slopes, moderately eroded
Le	Largent silt loam
LgA	Leadvale gravelly silt loam, 0 to 3 percent slopes
LgB2	Leadvale gravelly silt loam, 3 to 8 percent slopes, moderately eroded
Lm	Lindside silt loam
Ln	Lindside silt loam, local alluvium
LoB2	Litz channery loam, 3 to 10 percent slopes, moderately eroded
LoC2	Litz channery loam, 10 to 20 percent slopes, moderately eroded
LoC3	Litz channery loam, 10 to 20 percent slopes, severely eroded
LsB	Litz shaly loam, 0 to 10 percent slopes
LsB2	Litz shaly loam, 3 to 10 percent slopes, moderately eroded
LsC2	Litz shaly loam, 10 to 20 percent slopes, moderately eroded
LsC3	Litz shaly loam, 10 to 20 percent slopes, severely eroded
LsD2	Litz shaly loam, 20 to 30 percent slopes, moderately eroded
LsD3	Litz shaly loam, 20 to 30 percent slopes, severely eroded
LsE2	Litz shaly loam, 30 to 45 percent slopes, moderately eroded
LsE3	Litz shaly loam, 30 to 45 percent slopes, severely eroded
LsF	Litz shaly loam, 45 to 60 percent slopes
LtB	Litz-Teas channery silt loams, 0 to 8 percent slopes
LtC2	Litz-Teas channery silt loams, 3 to 15 percent slopes, moderately eroded
LtC3	Litz-Teas channery silt loams, 8 to 15 percent slopes, severely eroded
LtD2	Litz-Teas channery silt loams, 15 to 25 percent slopes, moderately eroded
LtD3	Litz-Teas channery silt loams, 15 to 25 percent slopes, severely eroded
LtE2	Litz-Teas channery silt loams, 25 to 45 percent slopes, moderately eroded
Me	Melvin silt loam
MgB2	Monongahela gravelly loam, 3 to 8 percent slopes, moderately eroded
MgC2	Monongahela gravelly loam, 8 to 15 percent slopes, moderately eroded
MhA	Monongahela silt loam, 0 to 3 percent slopes
MhB2	Monongahela silt loam, 3 to 8 percent slopes, moderately eroded
MhC2	Monongahela silt loam, 8 to 15 percent slopes, moderately eroded
MhD2	Monongahela silt loam, 15 to 25 percent slopes, moderately eroded
MmB2	Montevallo shaly loam, 0 to 10 percent slopes, moderately eroded
MmC2	Montevallo shaly loam, 10 to 20 percent slopes, moderately eroded
MmC3	Montevallo shaly loam, 10 to 20 percent slopes, severely eroded
MmD2	Montevallo shaly loam, 20 to 30 percent slopes, moderately eroded
MmD3	Montevallo shaly loam, 20 to 30 percent slopes, severely eroded
MoA	Murrill gravelly loam, 0 to 3 percent slopes
MoB2	Murrill gravelly loam, 0 to 8 percent slopes, moderately eroded
MoC2	Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded
MoD2	Murrill gravelly loam, 15 to 25 percent slopes, moderately eroded
MoD3	Murrill gravelly loam, 8 to 25 percent slopes, severely eroded
MoE2	Murrill gravelly loam, 25 to 45 percent slopes, moderately eroded
MrB	Murrill gravelly sandy loam, 0 to 8 percent slopes
MrC2	Murrill gravelly sandy loam, 3 to 15 percent slopes, moderately eroded
MrC3	Murrill gravelly sandy loam, 8 to 15 percent slopes, severely eroded
MrD2	Murrill gravelly sandy loam, 15 to 25 percent slopes, moderately eroded
MrD3	Murrill gravelly sandy loam, 15 to 25 percent slopes, severely eroded
MsA	Murrill silt loam, 0 to 3 percent slopes
MsB2	Murrill silt loam, 0 to 8 percent slopes, moderately eroded
MsC2	Murrill silt loam, 8 to 15 percent slopes, moderately eroded
MvA	Myersville channery loam, 0 to 3 percent slopes
MvB2	Myersville channery loam, 3 to 10 percent slopes, moderately eroded
MvC2	Myersville channery loam, 10 to 20 percent slopes, moderately eroded
MvD2	Myersville channery loam, 20 to 30 percent slopes, moderately eroded
MvE2	Myersville channery loam, 30 to 45 percent slopes, moderately eroded
MwB3	Myersville channery silt loam, 3 to 10 percent slopes, severely eroded
MwD3	Myersville channery silt loam, 10 to 30 percent slopes, severely eroded
MxA	Myersville silt loam, 0 to 3 percent slopes
MxB2	Myersville silt loam, 3 to 10 percent slopes, moderately eroded
MxC2	Myersville silt loam, 10 to 20 percent slopes, moderately eroded
MyE2	Myersville very stony loam, 3 to 30 percent slopes, moderately eroded
MyF2	Myersville very stony loam, 30 to 55 percent slopes, eroded
Pg	Philo gravelly sandy loam
Ph	Philo silt loam
Pn	Pope fine sandy loam
Po	Pope gravelly loam
Pp	Pope gravelly sandy loam
Ps	Pope silt loam
Pt	Pope stony gravelly loam
Rk	Rocky eroded land
RoB2	Rohrersville silty clay loam, 0 to 8 percent slopes, moderately eroded
Sr	Stony rolling land
Ss	Stony steep land
TaC2	Talladega gravelly silt loam, thick solum variant, 0 to 20 percent slopes, moderately eroded
TaD3	Talladega gravelly silt loam, thick solum variant, 10 to 20 percent slopes, severely eroded
TaD	Talladega gravelly silt loam, thick solum variant, 20 to 30 percent slopes
TaE2	Talladega gravelly silt loam, thick solum variant, 20 to 45 percent slopes, moderately eroded
Te	Terrace escarpments
ThB2	Thurmont gravelly loam, 3 to 8 percent slopes, moderately eroded
ThC2	Thurmont gravelly loam, 8 to 15 percent slopes, moderately eroded
TrA	Trego gravelly silt loam, 0 to 3 percent slopes
TrC2	Trego gravelly silt loam, 3 to 15 percent slopes, moderately eroded
TyB	Tyler silt loam, 0 to 8 percent slopes
Wa	Warners loam, 0 to 8 percent slopes
WbA	Waynesboro gravelly loam, 0 to 3 percent slopes
WbB2	Waynesboro gravelly loam, 0 to 8 percent slopes, moderately eroded
WbC2	Waynesboro gravelly loam, 8 to 15 percent slopes, moderately eroded
WbC3	Waynesboro gravelly loam, 3 to 15 percent slopes, severely eroded
WbD2	Waynesboro gravelly loam, 15 to 25 percent slopes, moderately eroded
WbD3	Waynesboro gravelly loam, 15 to 25 percent slopes, severely eroded
WbE2	Waynesboro gravelly loam, 25 to 45 percent slopes, moderately eroded
WgB	Waynesboro gravelly sandy loam, 0 to 8 percent slopes
WgC2	Waynesboro gravelly sandy loam, 3 to 15 percent slopes, moderately eroded
WgC3	Waynesboro gravelly sandy loam, 8 to 15 percent slopes, severely eroded
WgD2	Waynesboro gravelly sandy loam, 15 to 25 percent slopes, moderately eroded
Wh	Wehadkee silt loam
WmB2	Westmoreland channery silt loam, 3 to 10 percent slopes, moderately eroded
WmC2	Westmoreland channery silt loam, 10 to 20 percent slopes, moderately eroded
WmC3	Westmoreland channery silt loam, 3 to 20 percent slopes, severely eroded
WmD2	Westmoreland channery silt loam, 20 to 30 percent slopes, moderately eroded
WmD3	Westmoreland channery silt loam, 20 to 30 percent slopes, severely eroded

Soil map constructed 1961 by Cartographic Division, Soil Conservation Service, USDA, from 1957 aerial photographs. Controlled mosaic based on Maryland plane coordinate system, Lambert conformal conic projection, 1927 North American datum.

WASHINGTON COUNTY, MARYLAND
CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads

- Dual
- Good motor
- Poor motor
- Trail

Highway markers

- National Interstate
- U. S.
- State

Railroads

- Single track
- Multiple track
- Abandoned

Bridges and crossings

- Road
- Trail, foot
- Railroad
- Ferries
- Ford
- Grade
- R. R. over
- R. R. under
- Tunnel

Buildings

- School
- Church
- Station

Mines and Quarries

Mine dump

Pits, gravel or other

Power lines

Pipe lines

Cemeteries

Dams

Levees

Tanks

Oil wells

Canal locks (point upstream)

BOUNDARIES

- National or state
- County
- Township, U. S.
- Section line, corner
- Reservation
- Land grant

DRAINAGE

Streams

- Perennial
- Intermittent, unclass.

Canals and ditches

Lakes and ponds

- Perennial
- Intermittent

Wells

Springs

Marsh

Wet spot

Canal Aqueduct

RELIEF

Escarpments

- Bedrock
- Other

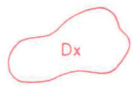
Prominent peaks

Depressions

	Large	Small
Crossable with tillage implements		
Not crossable with tillage implements		
Contains water most of the time		

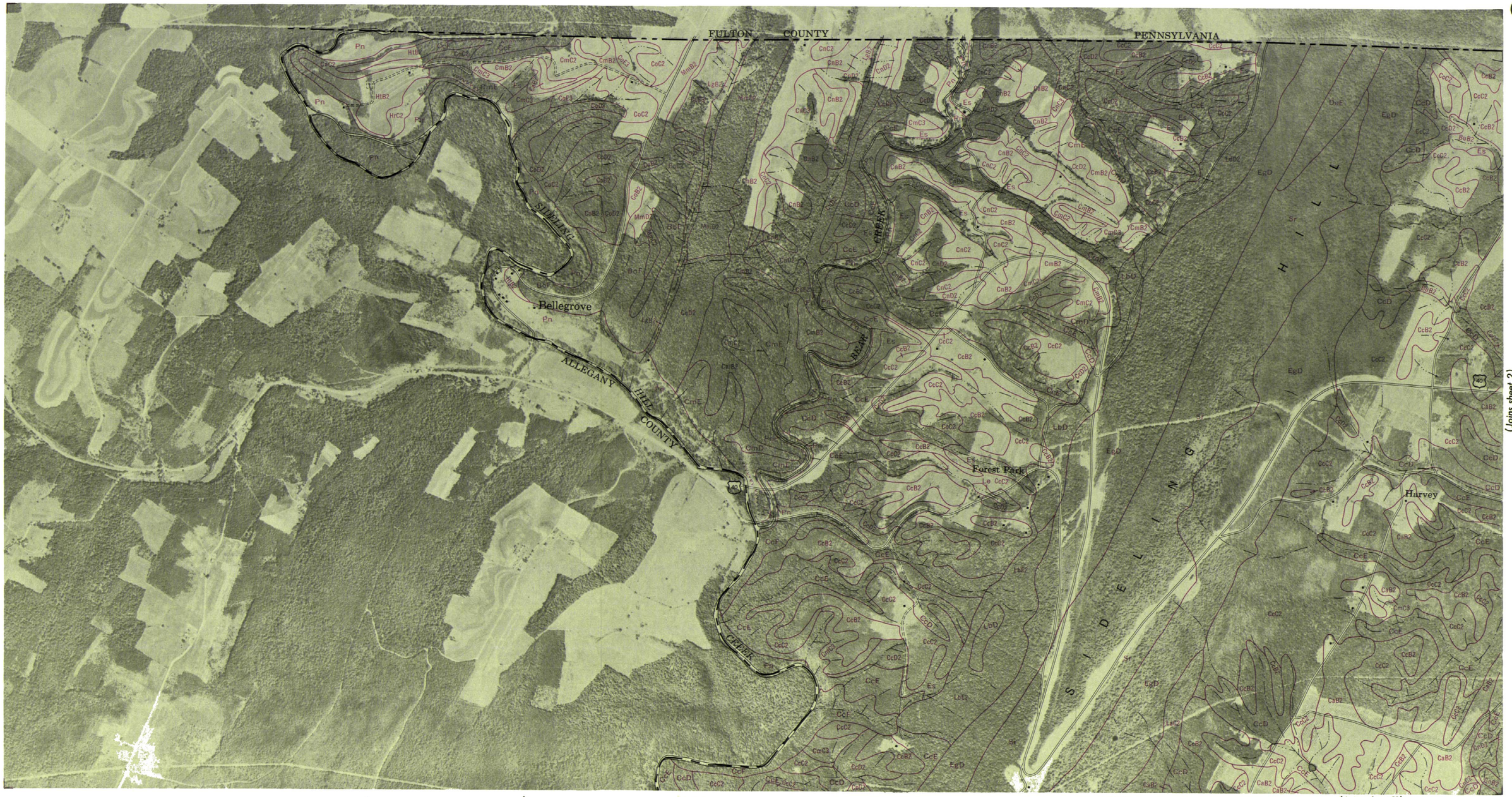
SOIL SURVEY DATA

Soil boundary and symbol



- Gravel
- Stones
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gullies

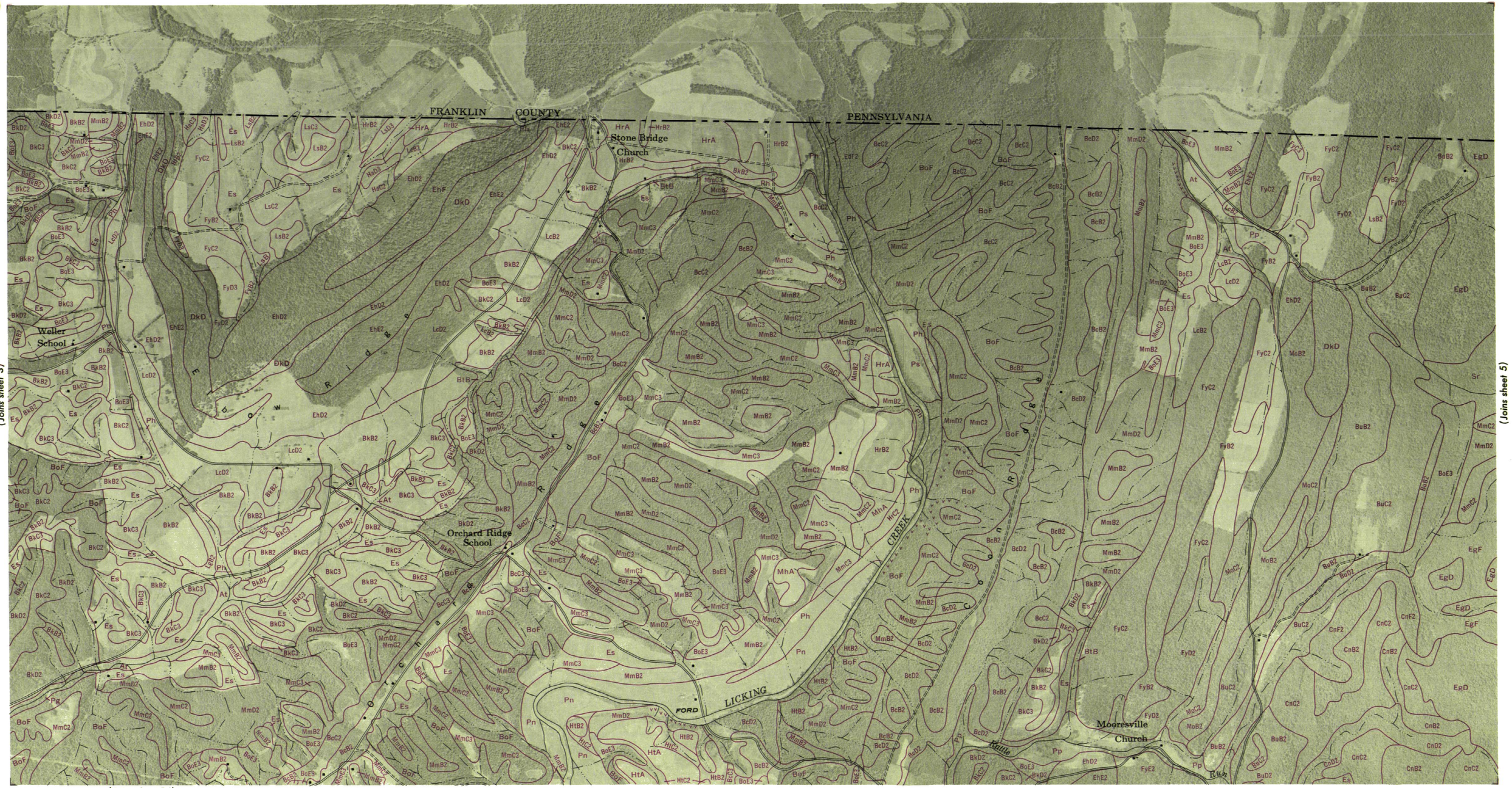
WASHINGTON COUNTY, MARYLAND–SHEET NUMBER 1



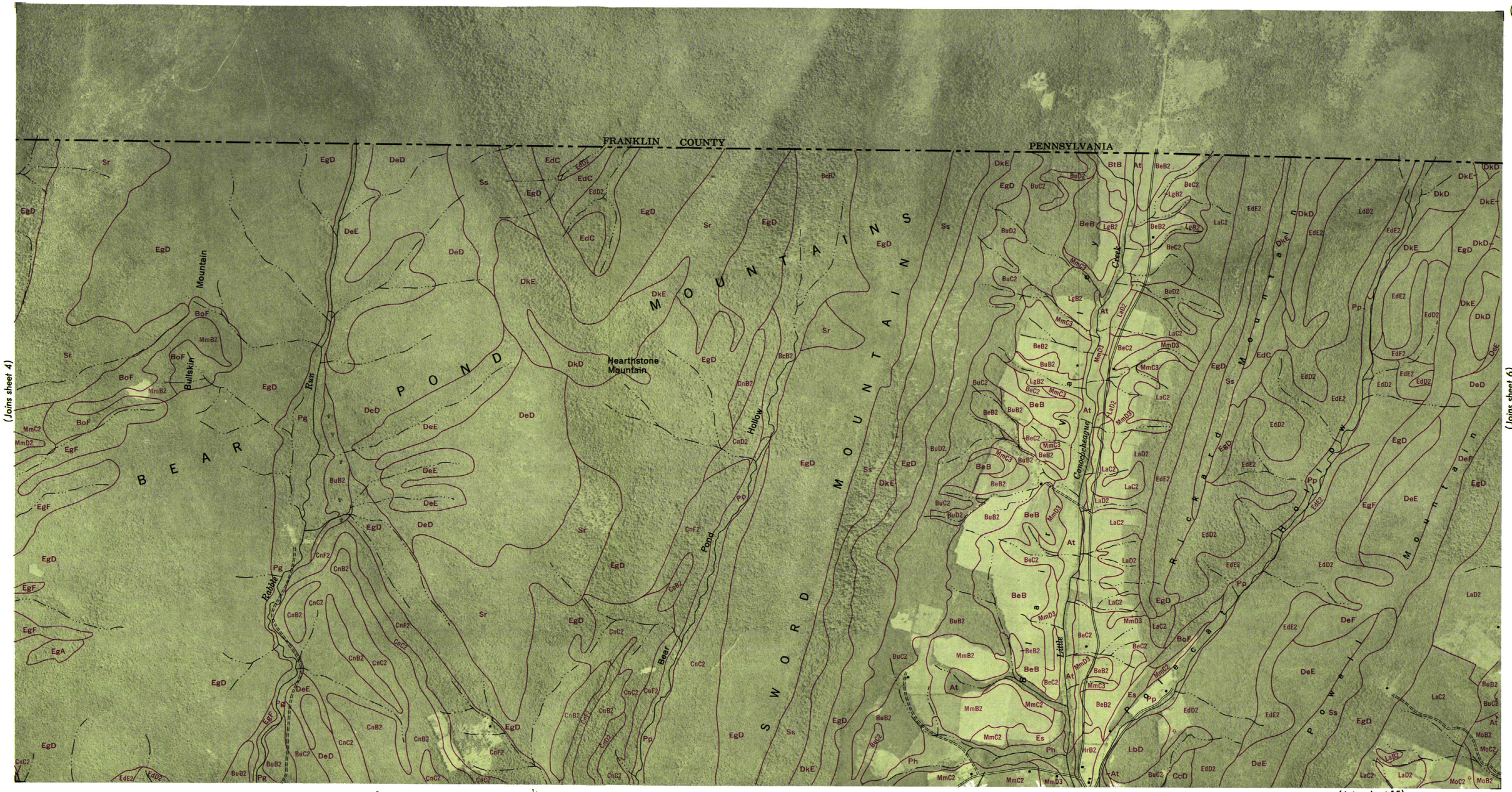
This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1958.


2
N
FULTON COUNTY
PENNSYLVANIA
RIDGE
TONOLOWAY
Sawhill Hollow
St. Pauls Church
Mt. Olivet Church
Tonoloway
Little
Creek
Branch
Spring
Myersdale
Blue Hill
Hancock
MARYLAND
WESTERN MARYLAND RAILROAD (ABANDONED)
CHESAPEAKE AND OHIO CANAL
POTOMAC RIVER
MORGAN CO W VA
UNSURVEYED AREA
(Joins sheet 1)
(Joins sheet 3)
(Joins sheet 12)
0 ½ 1 Mile
Scale 1:15840
0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1958.


N
FRANKLIN COUNTY
PENNSYLVANIA
Stone Bridge Church
Weller School
Orchard Ridge School
Mooresville Church
FORD
LICKING CREEK
Rattle Run
(Joins sheet 3)
(Joins sheet 5)
(Joins sheet 14)
0 ½ 1 Mile
Scale 1:15840
0 5000 Feet

WASHINGTON COUNTY, MARYLAND – SHEET NUMBER 5



0 ½ 1 Mile

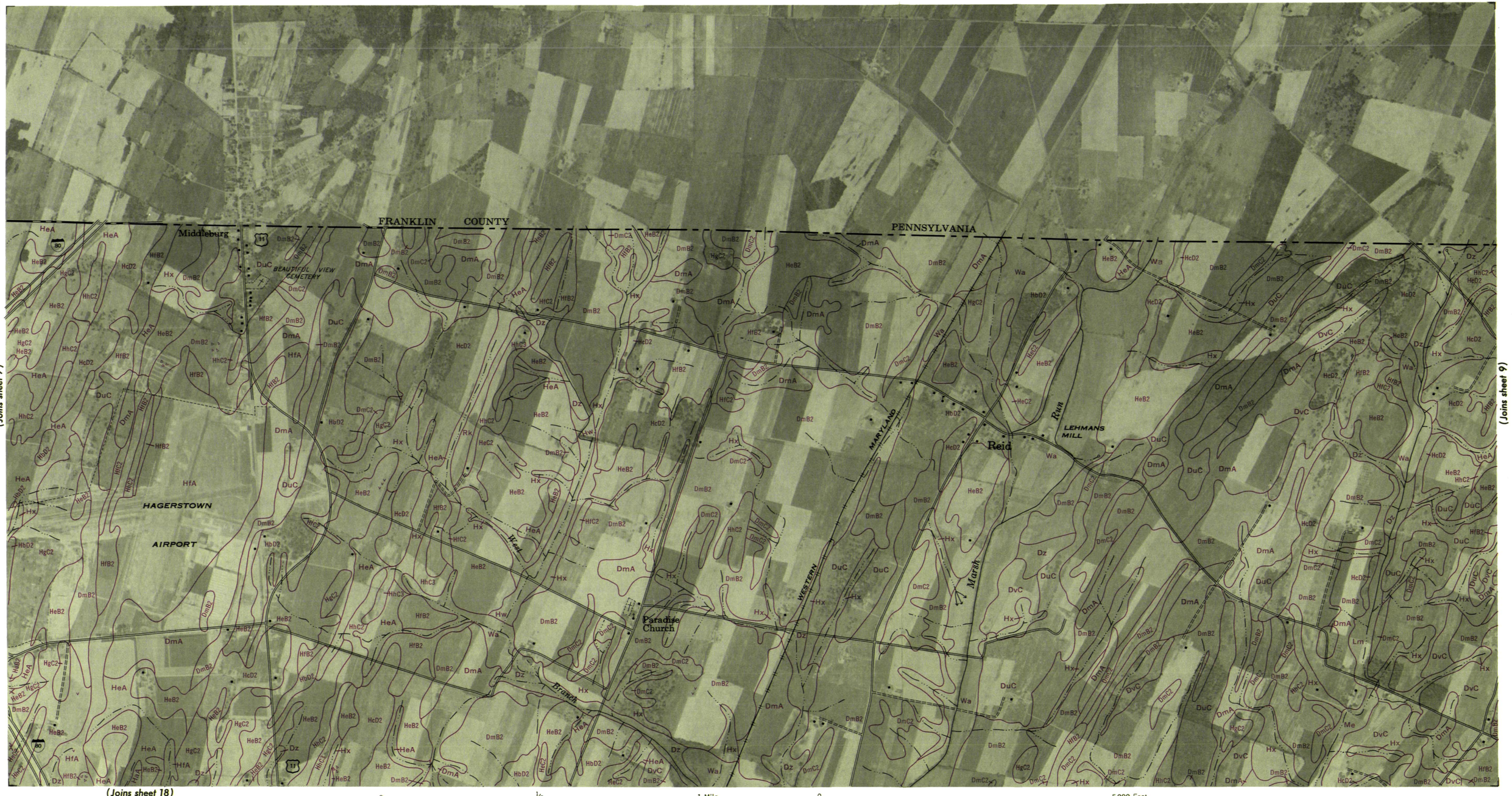
Scale 1:15840

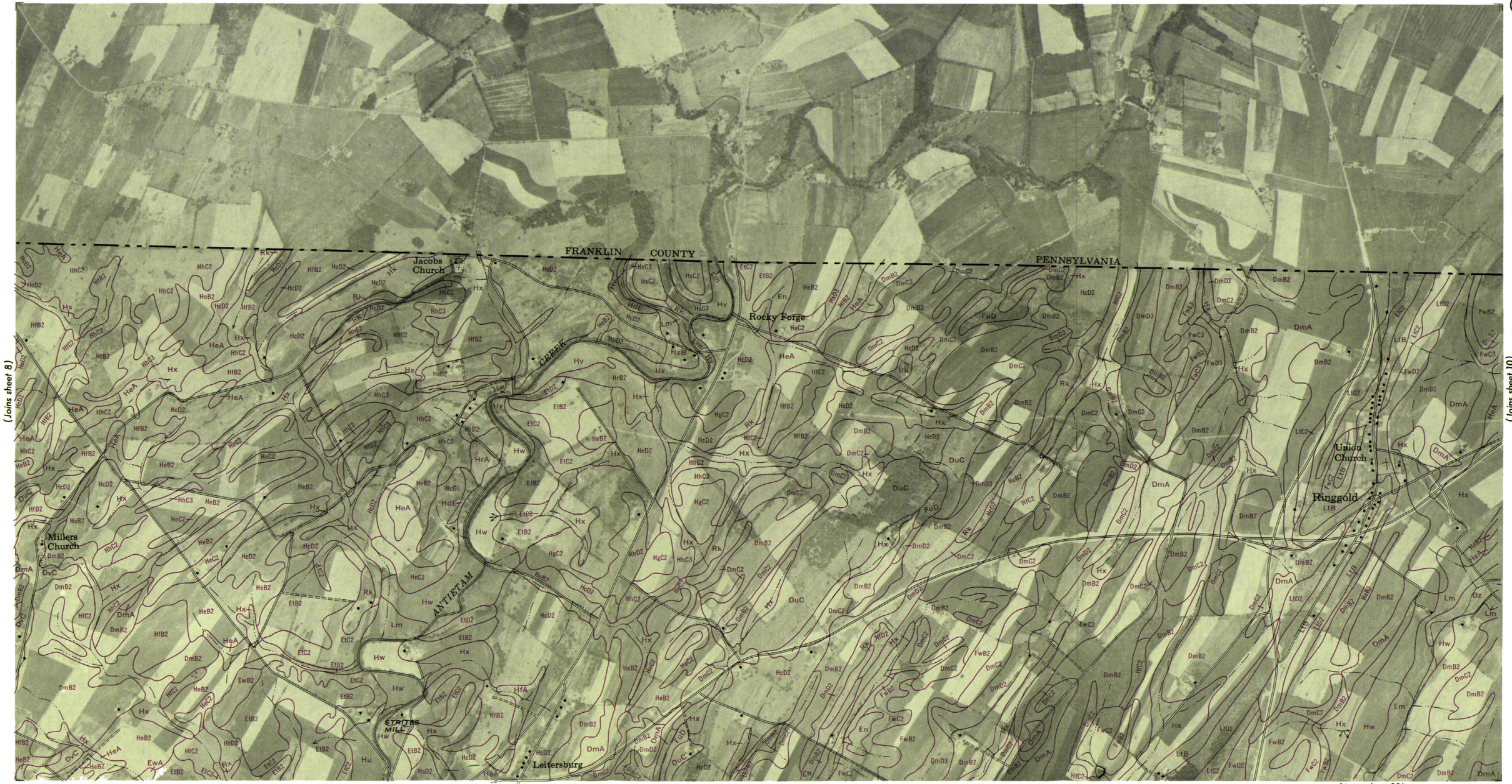
0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1958.


6
N
FRANKLIN COUNTY
PENNSYLVANIA
Powell Mountain
Dry Run
Dry Run
Run
Rockdale Run
Meadow Brook
CUSHWA MILL
Mt Tabor Church
Fairview
Rockdale
Fairview Mill
CONOCOCHEAGUE CREEK
(Joins sheet 5)
(Joins sheet 7)
(Joins sheet 16)
0 ½ 1 Mile
Scale 1:15840
0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1958.

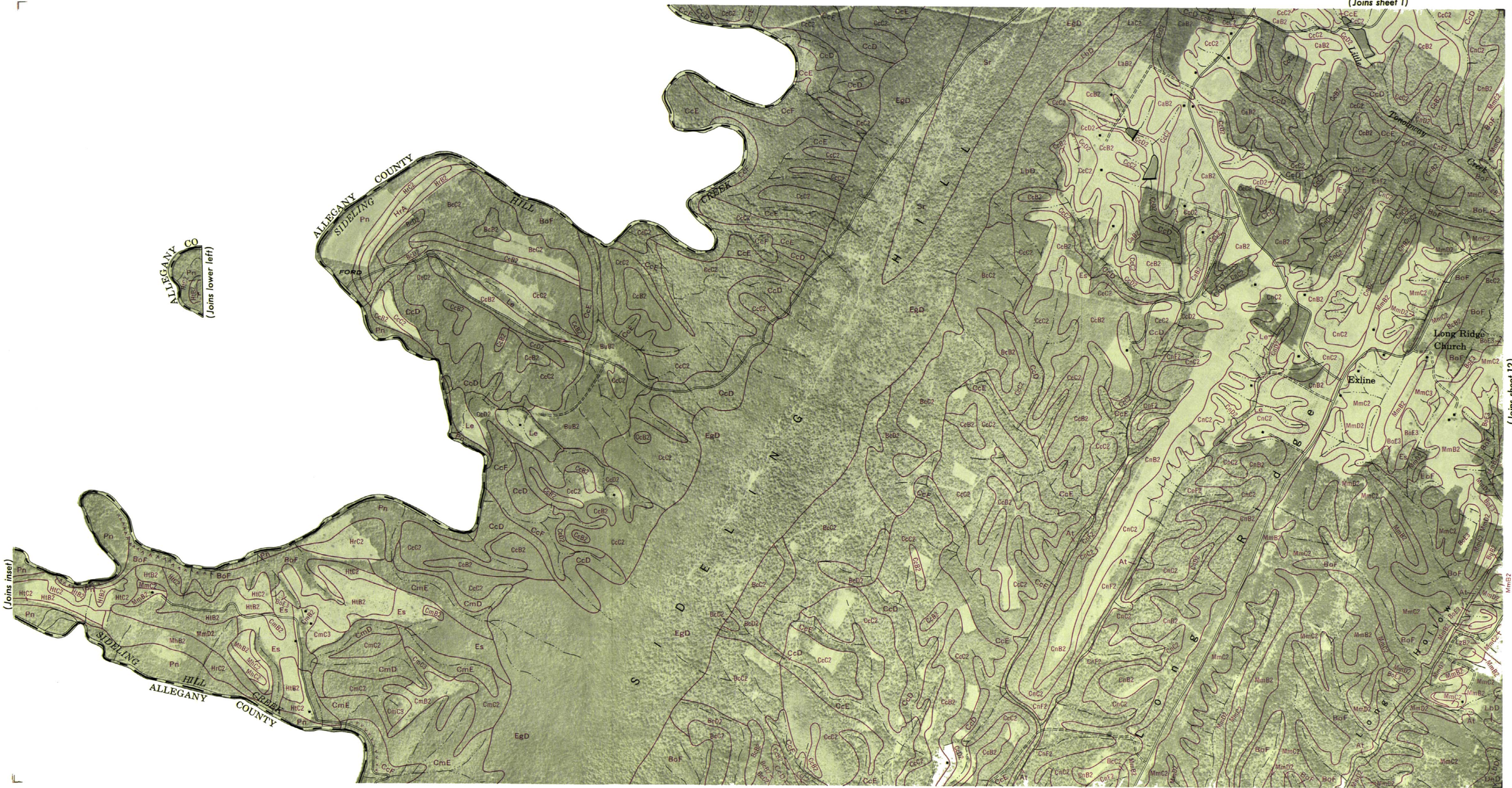

8
N
FRANKLIN COUNTY
PENNSYLVANIA
Middleburg
BEAUTIFUL VIEW CEMETERY
HAGERSTOWN AIRPORT
Paradise Church
Reid
LEHMANS MILL
MARYLAND
WESTERN
Marsh
Run
Branch
Wash
(Joins sheet 7)
(Joins sheet 9)
(Joins sheet 18)
0 1/2 1 Mile
Scale 1:15840
0 5000 Feet



This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1958.


N
(Joins sheet 9)
(Joins sheet 20)
FRANKLIN COUNTY
PENNSYLVANIA
Pen Mar
Highfield
Cascade
Shockeys
Blue Mountain
Blue Mountain
Quirauk Mountain
SOUTH MOUNTAIN
FORT RITCHIE MILITARY RESERVATION
Lake Royer
Falls Creek
MARYLAND
WESTERN
FREDERICK COUNTY
0 ½ 1 Mile
Scale 1:15840
0 5000 Feet

(Joins sheet 1)

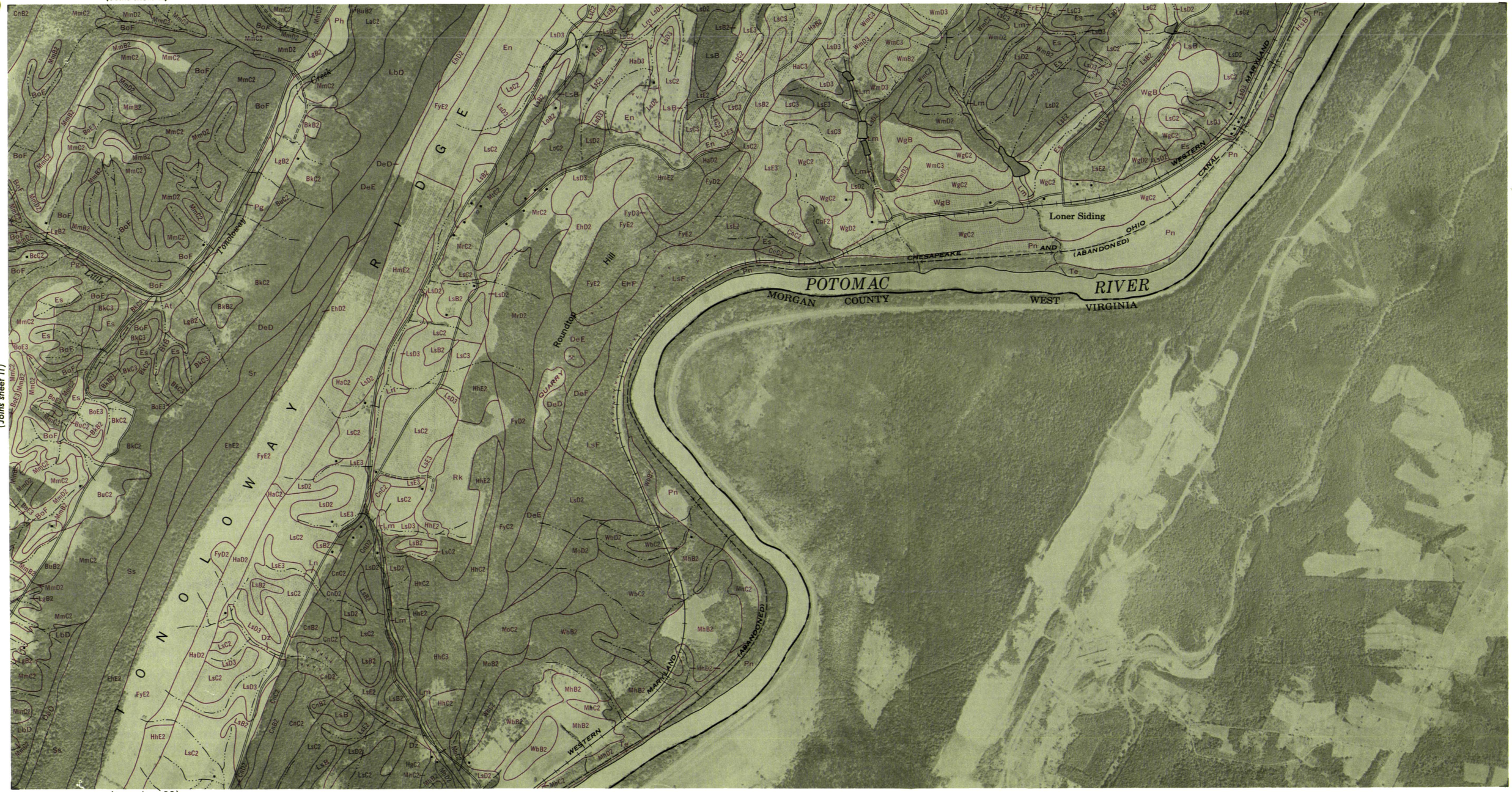


12

(Joins sheet 2)

(Joins sheet 11)

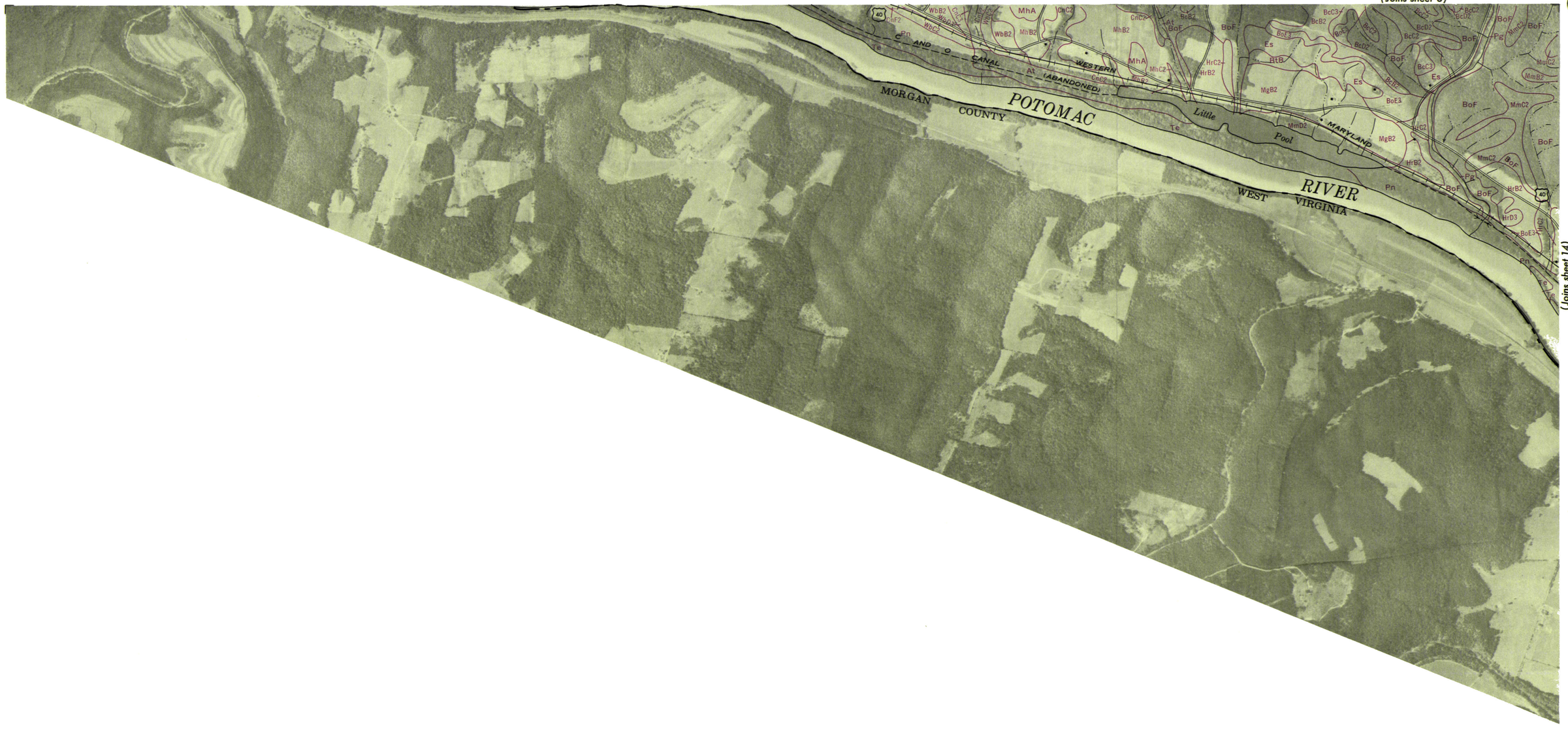
(Joins sheet 22)



WASHINGTON COUNTY, MARYLAND – SHEET NUMBER 13

(Joins sheet 3)

(Joins sheet 14)



N

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1958.

(Joins sheet 4)

N

(Joins sheet 13)

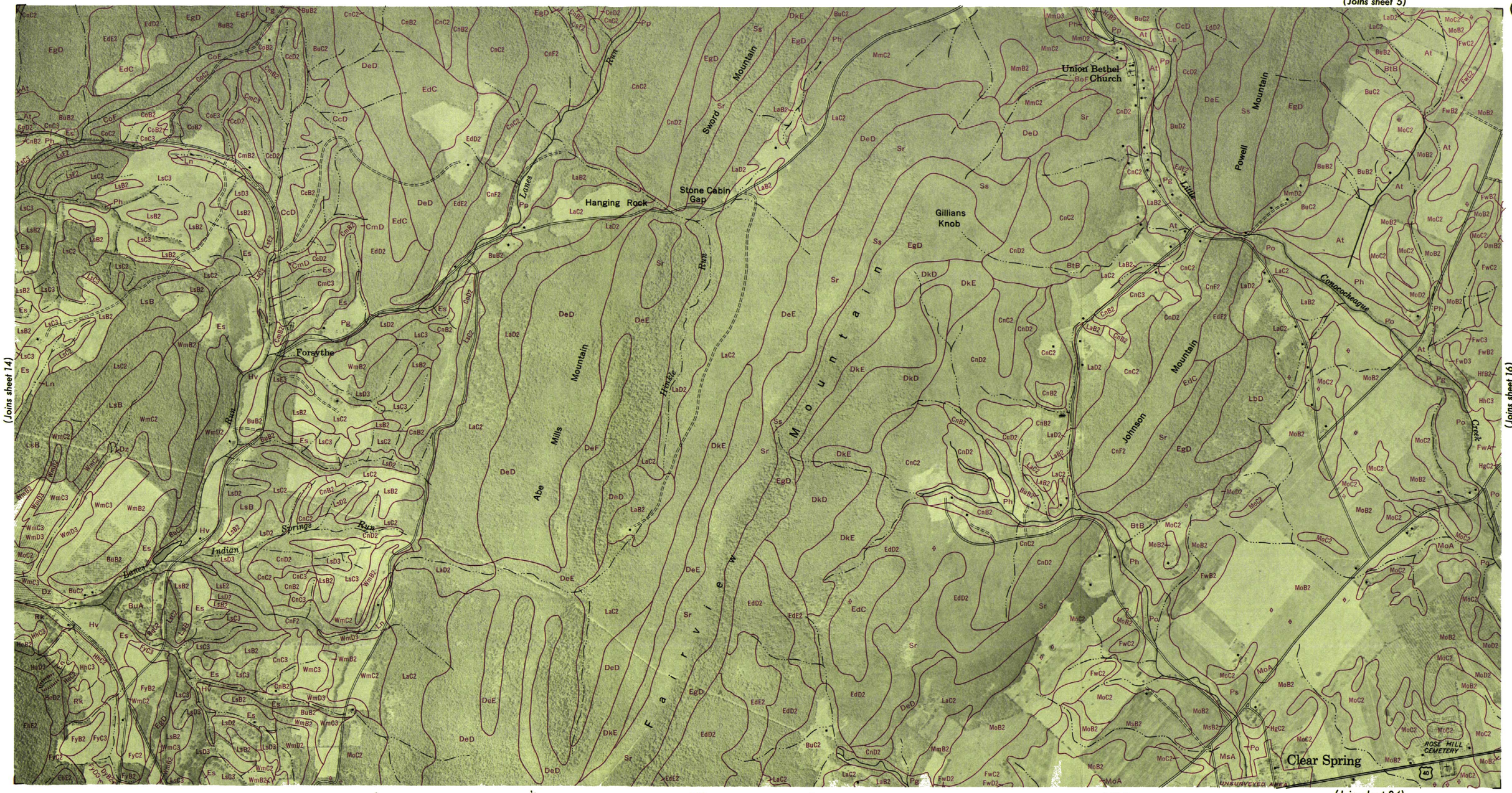
(Joins sheet 15)

(Joins sheet 23)

0 ½ 1 Mile Scale 1:15840 0 5000 Feet

WASHINGTON COUNTY, MARYLAND–SHEET NUMBER 15

(Joins sheet 5)



(Joins sheet 14)

(Joins sheet 16)

(Joins sheet 24)

16

(Joins sheet 6)

N

(Joins sheet 15)

(Joins sheet 17)

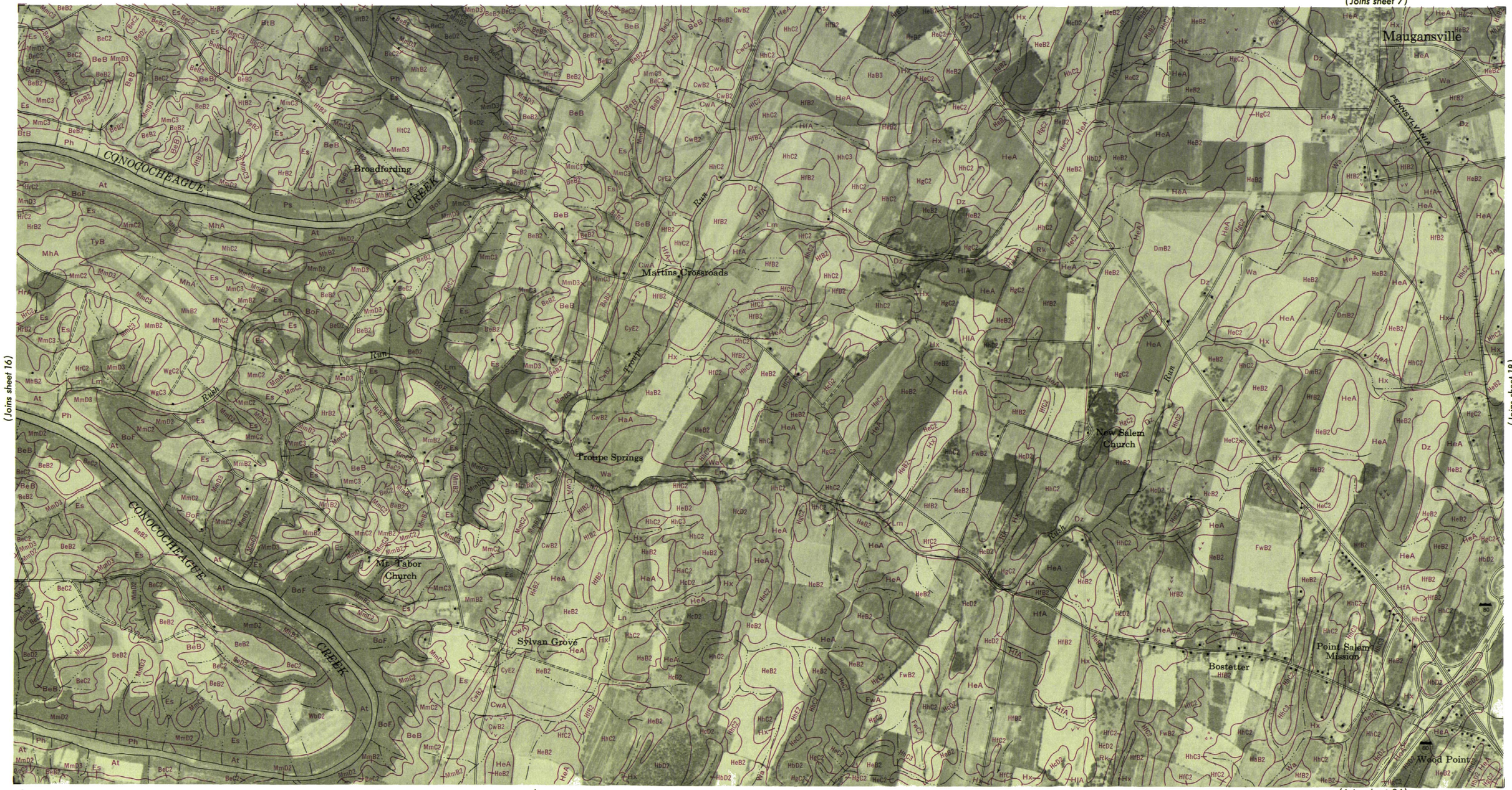
(Joins sheet 25)

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

(Joins sheet 7)



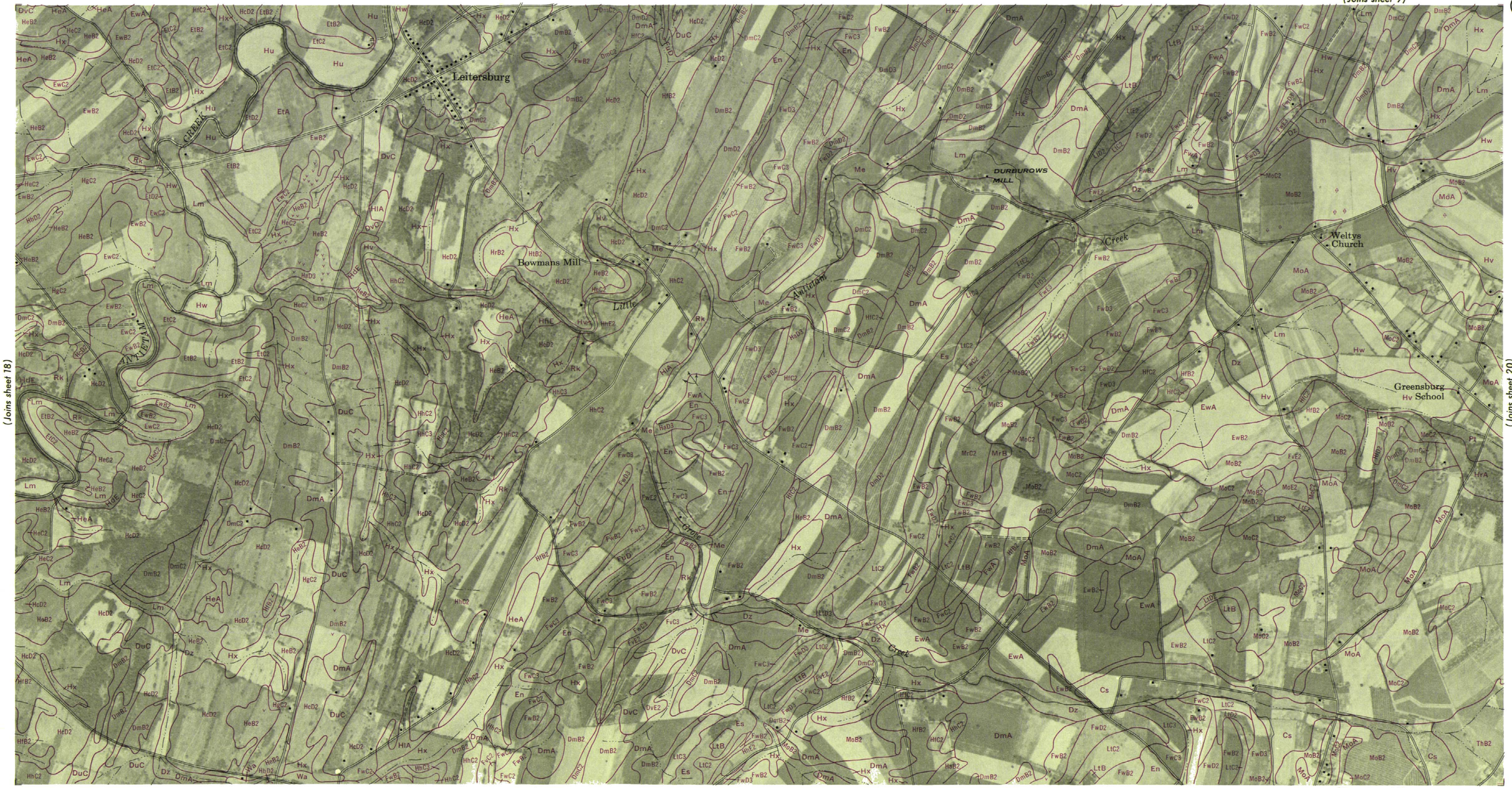
(Joins sheet 16)

(Joins sheet 18)

(Joins sheet 26)


(18)
(Joins sheet 8)
N
(Joins sheet 17)
(Joins sheet 19)
(Joins sheet 27)
Paramount
Longmeadow Church
Fountain Head
REST HAVEN CEMETERY
HAGERSTOWN
MARYLAND
WESTERN
PENNSYLVANIA
Hamilton Run
West Branch
Marsh Run
ANTIETAM CREEK
Rush Run
0 1/2 1 Mile
Scale 1:15840
0 5000 Feet

(Joins sheet 9)



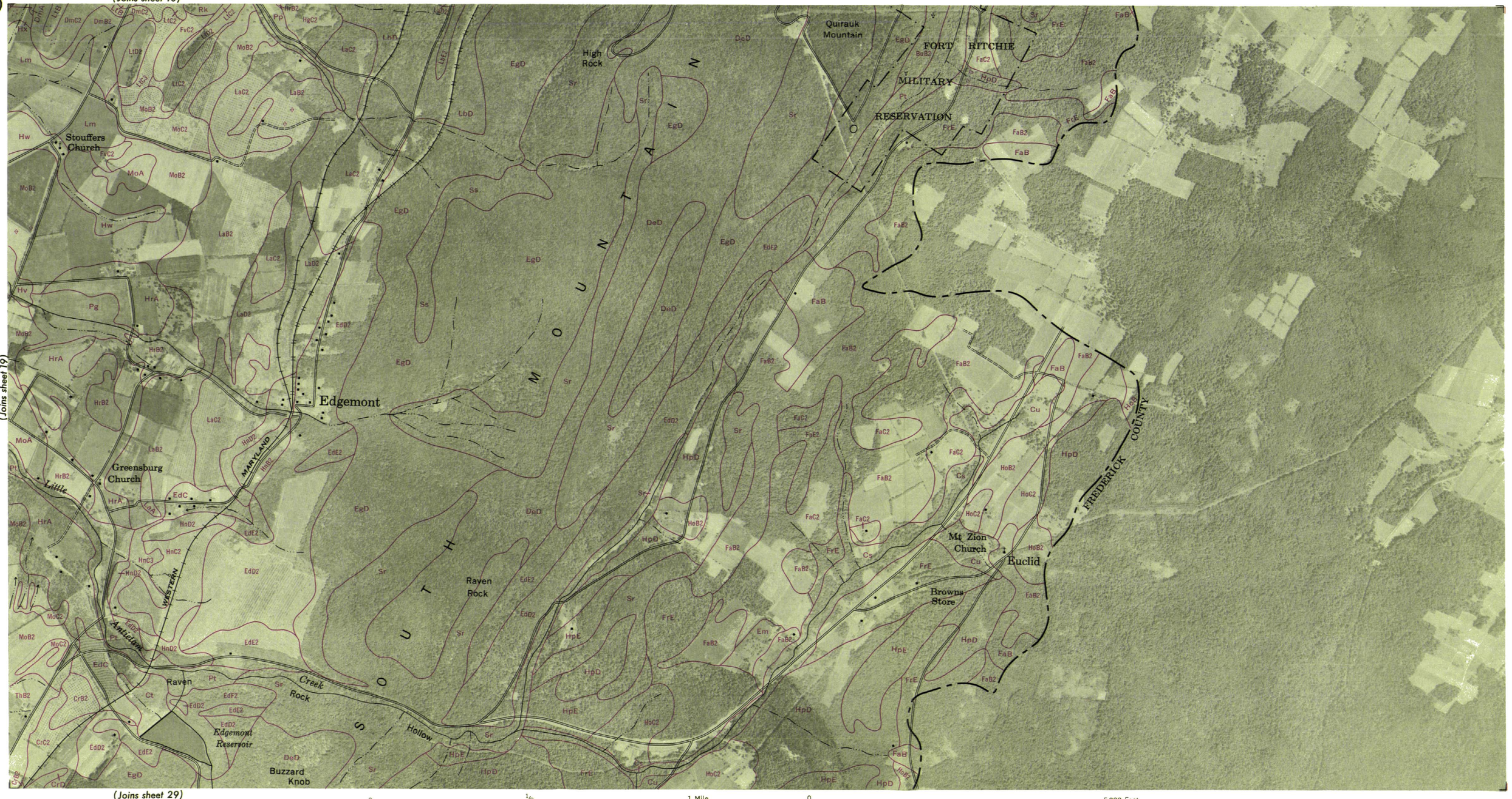
(Joins sheet 18)

(Joins sheet 20)

(Joins sheet 28)

0 ½ 1 Mile Scale 1:15840 0 5000 Feet

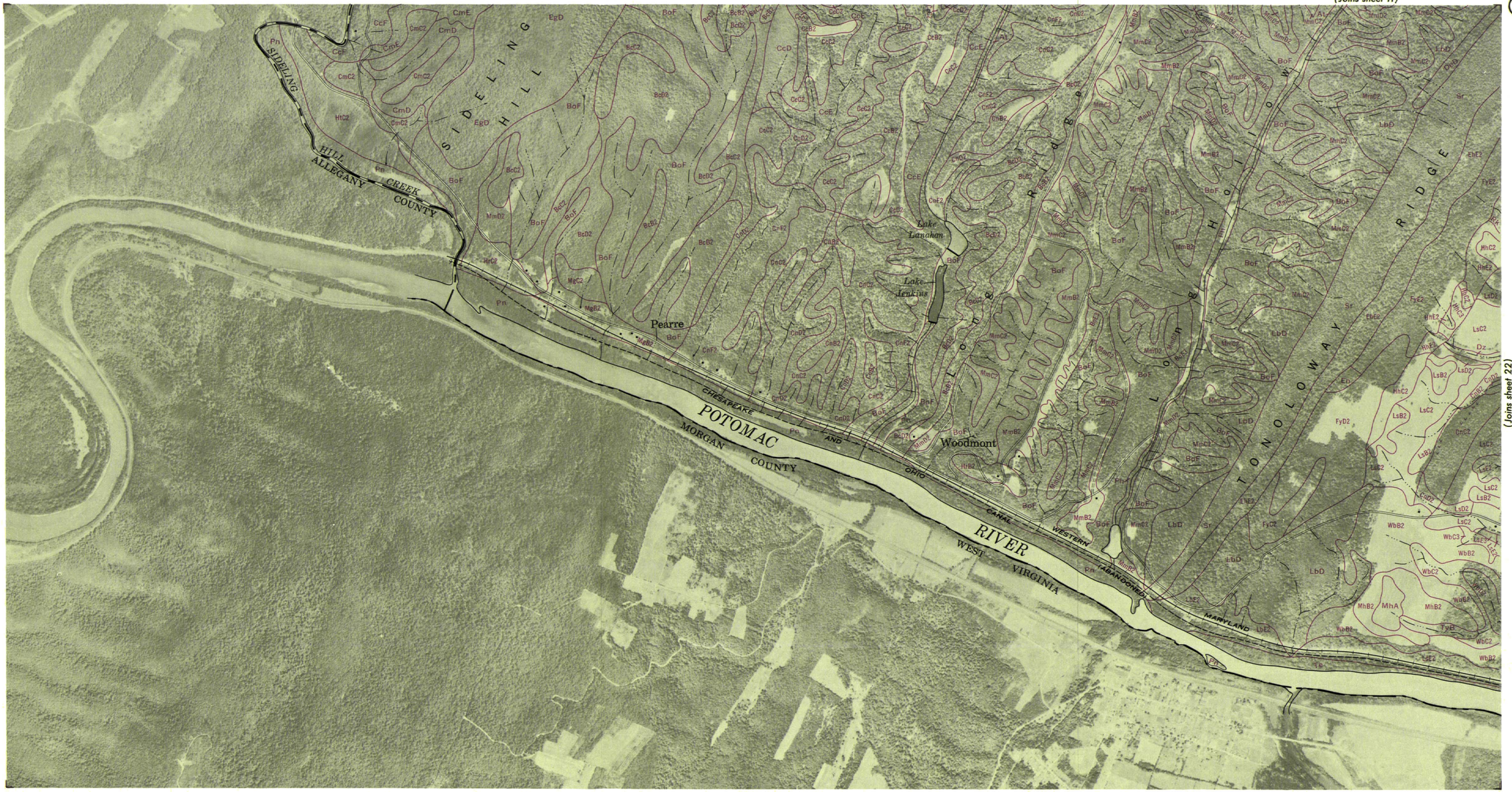
This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1958.



0 ½ 1 Mile Scale 1:15840 0 5000 Feet

WASHINGTON COUNTY, MARYLAND – SHEET NUMBER 21

(Joins sheet 11)



(Joins sheet 22)

0 ½ 1 Mile Scale 1:15840 0 5000 Feet

WASHINGTON COUNTY, MARYLAND – SHEET NUMBER 22

22

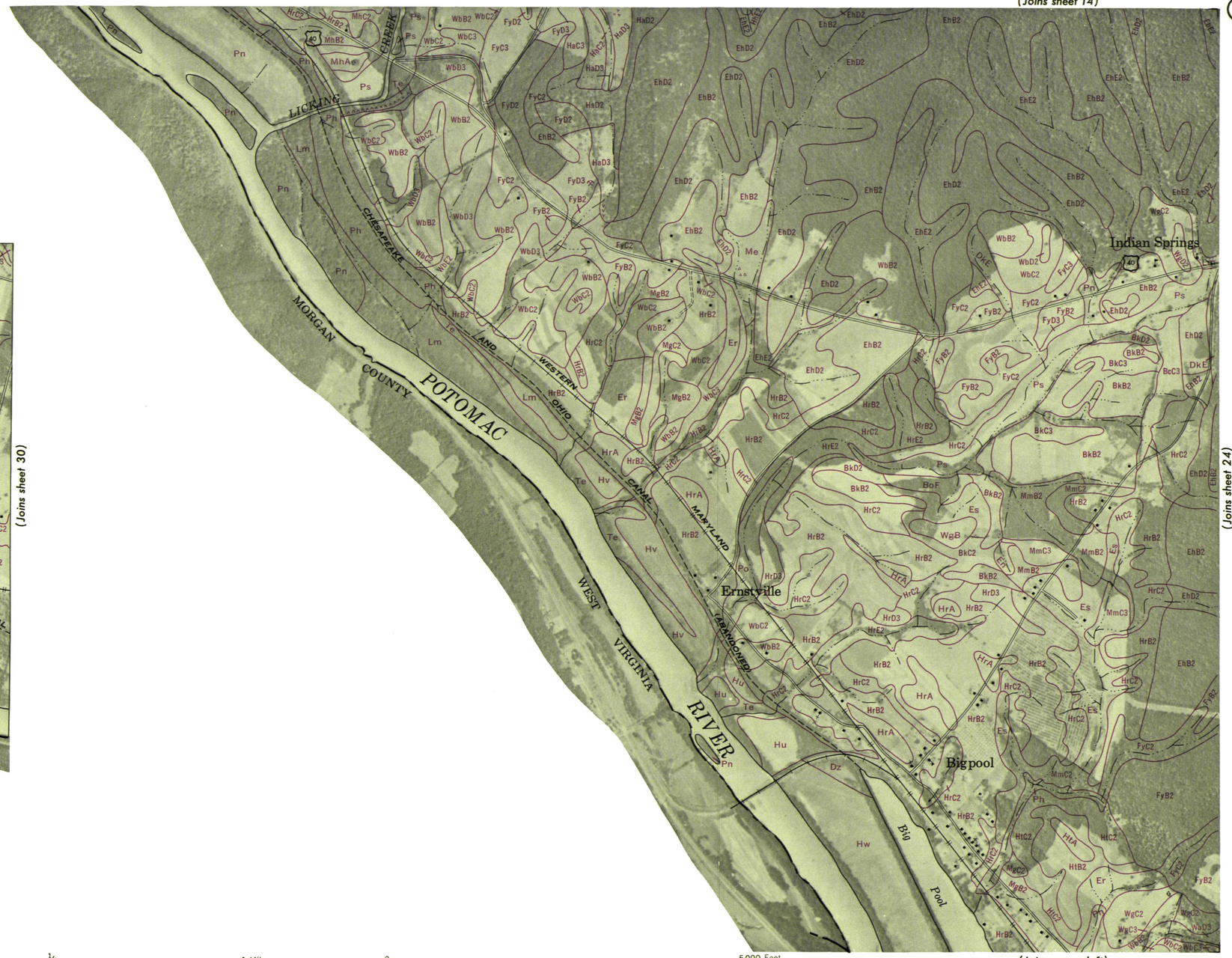
(Joins sheet 12)

(Joins sheet 21)

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet



N

0 1/2 1 Mile

Scale 1:15840

0 5000 Feet

(24)

(Joins sheet 15)

(Joins sheet 23)

(Joins sheet 25)

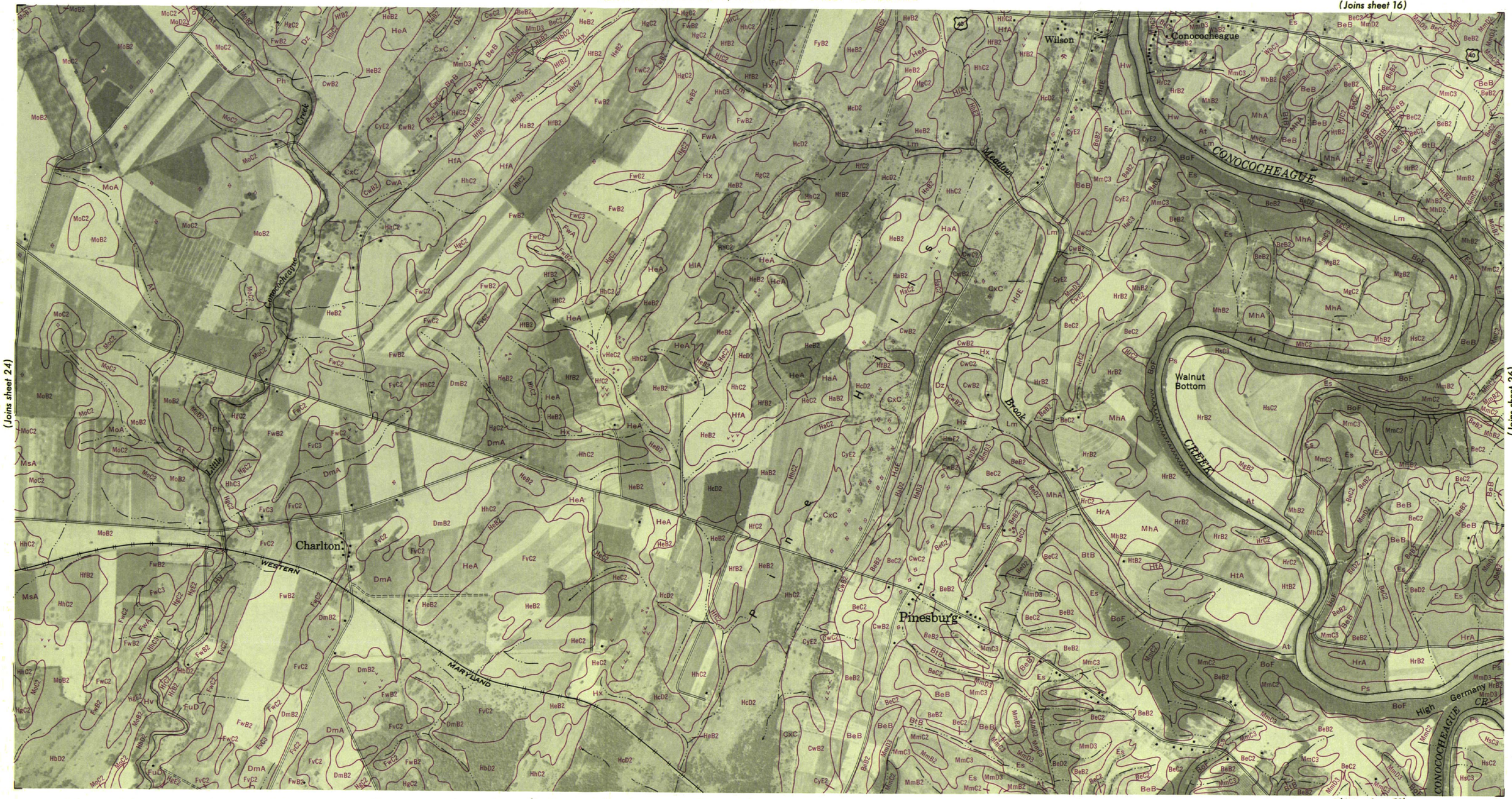
(Joins sheet 30)

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

WASHINGTON COUNTY, MARYLAND – SHEET NUMBER 25



0 ½ 1 Mile Scale 1:15840 0 5000 Feet

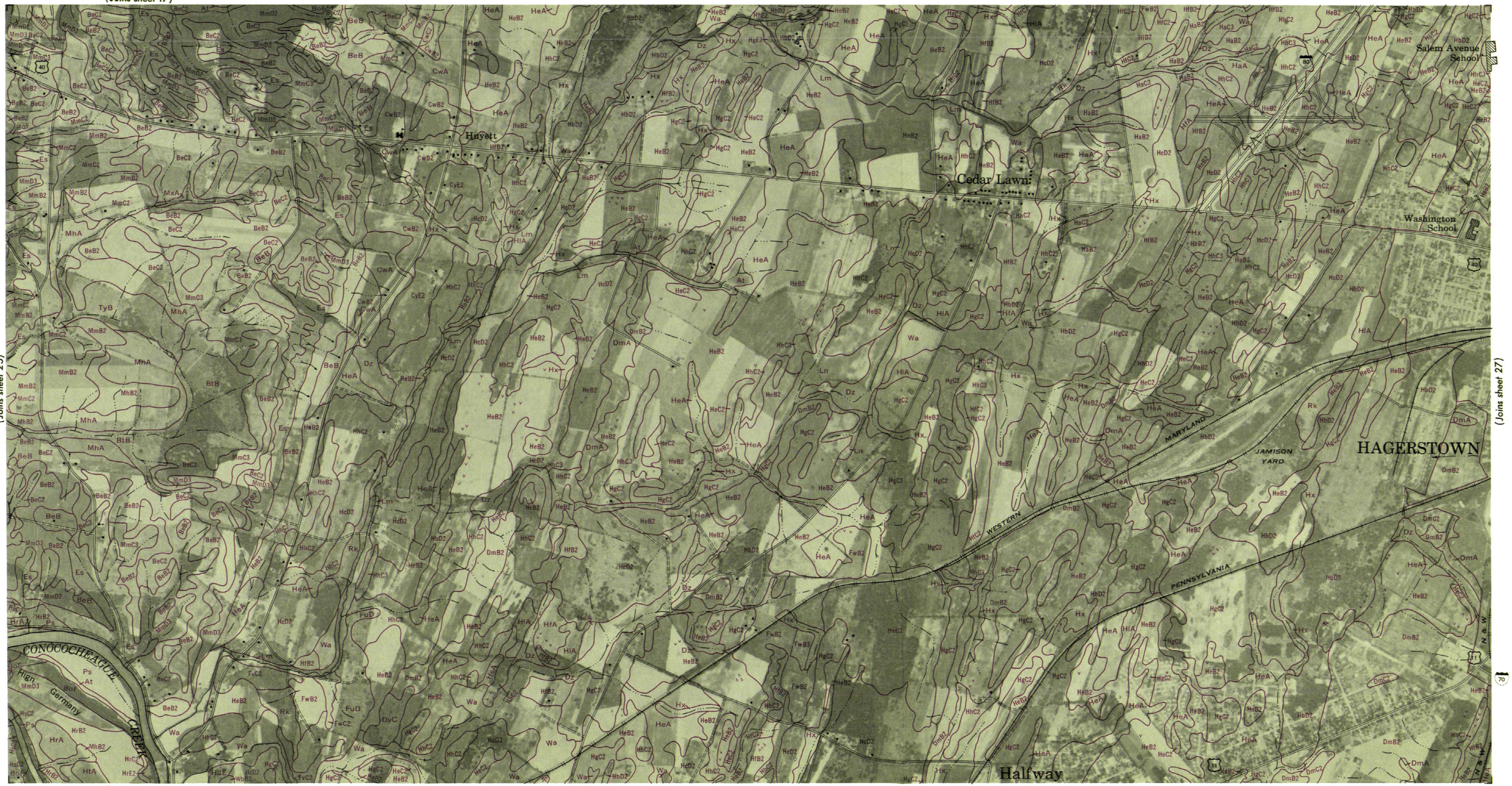
This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1958

(Joins sheet 17)

(Joins sheet 25)

(Joins sheet 27)

(Joins sheet 32)



WASHINGTON COUNTY, MARYLAND—SHEET NUMBER 27

(Joins sheet 18)

(Joins sheet 26)

(Joins sheet 28)

(Joins sheet 33)

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1958.

(Joins sheet 19)

(Joins sheet 27)

(Joins sheet 29)

(Joins sheet 34)

(Joins sheet 20)

0 ½ 1 Mile

Scale 1:15840

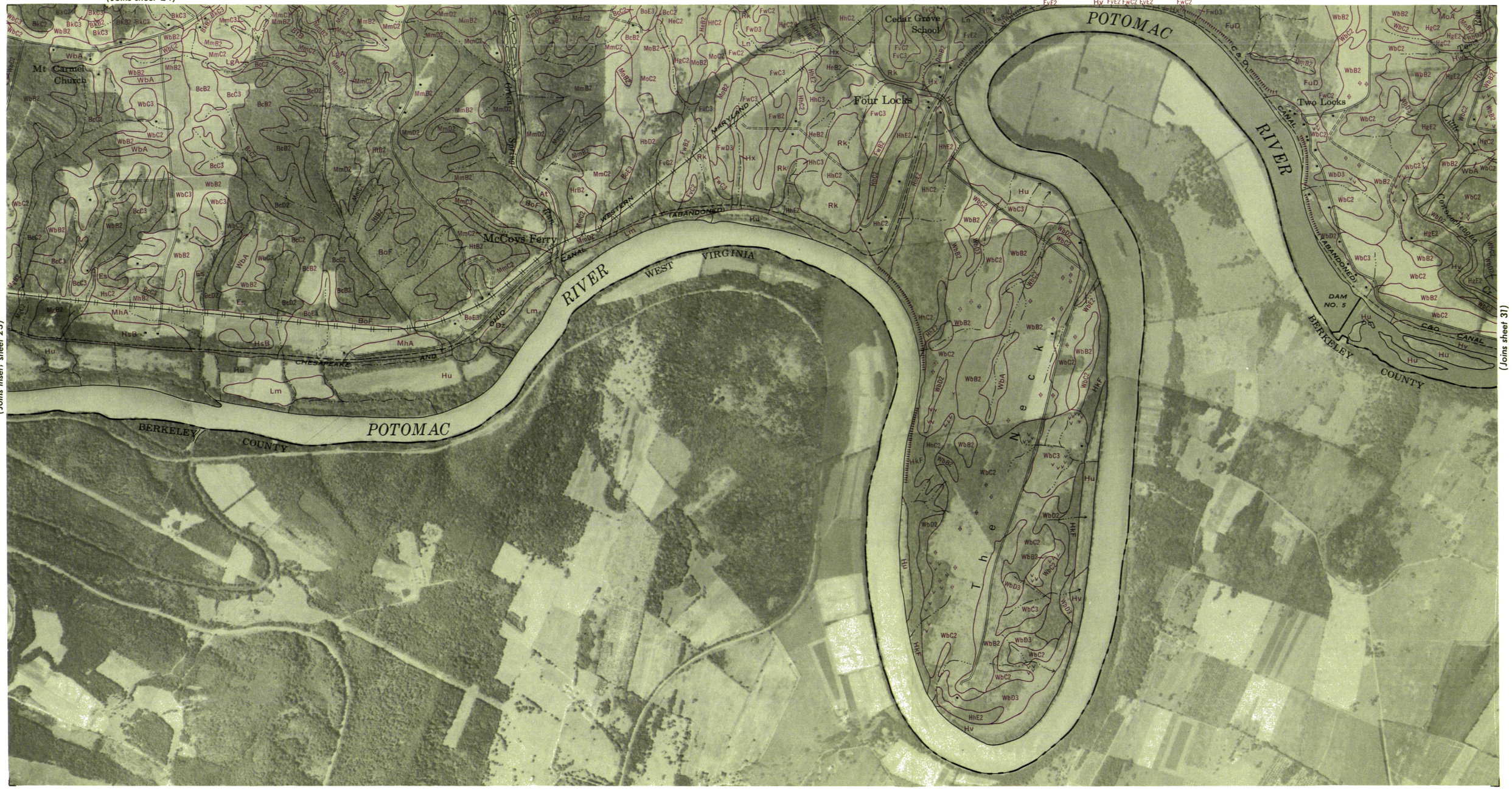
0 5000 Feet

N

(Joins sheet 24)

(Joins inset, sheet 23)

(Joins sheet 31)



(Joins sheet 25)

32

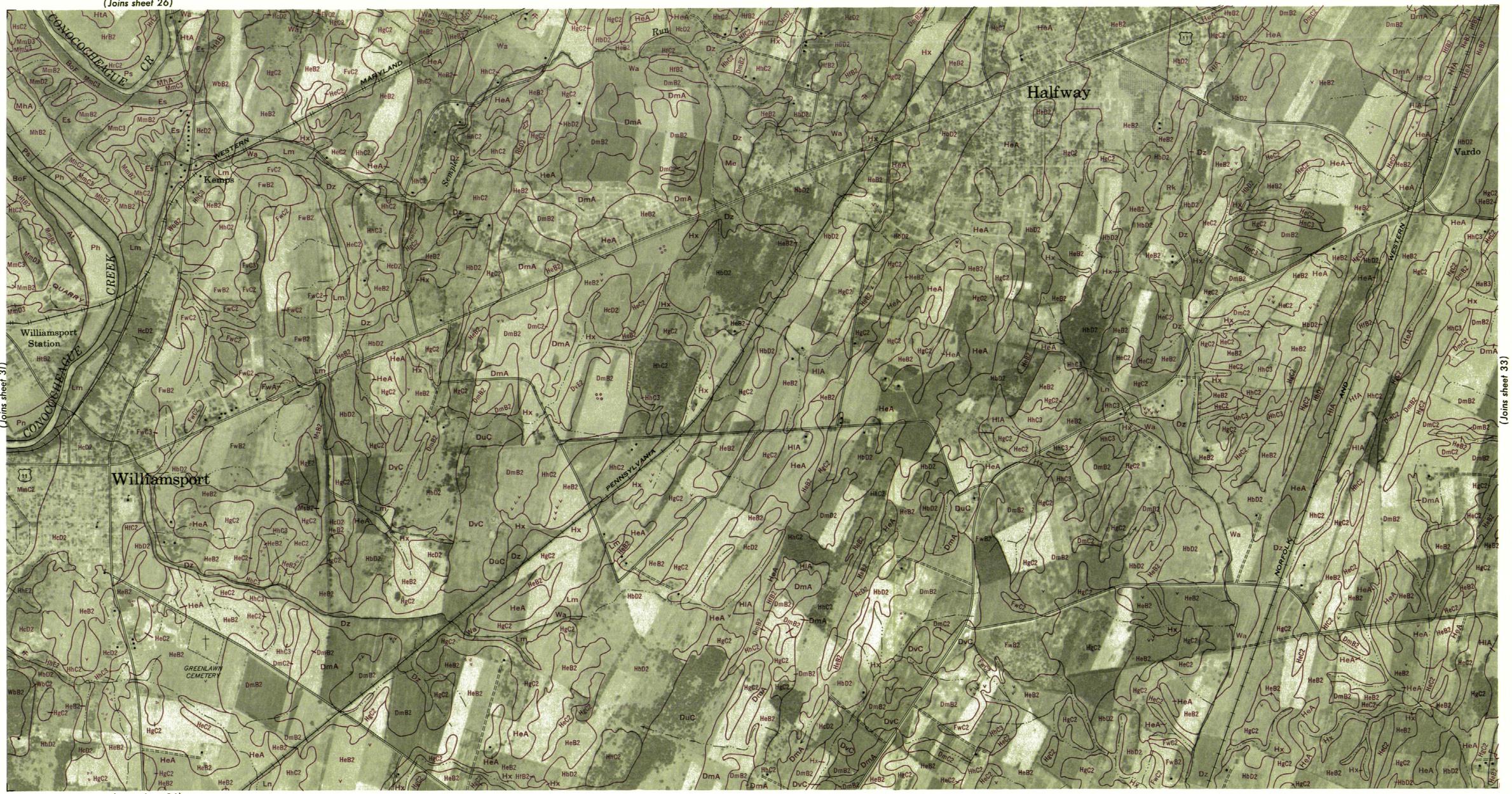
(Joins sheet 26)

N

(Joins sheet 31)

(Joins sheet 33)

(Joins sheet 36)



0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

WASHINGTON COUNTY, MARYLAND – SHEET NUMBER 33

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1958.

(34)

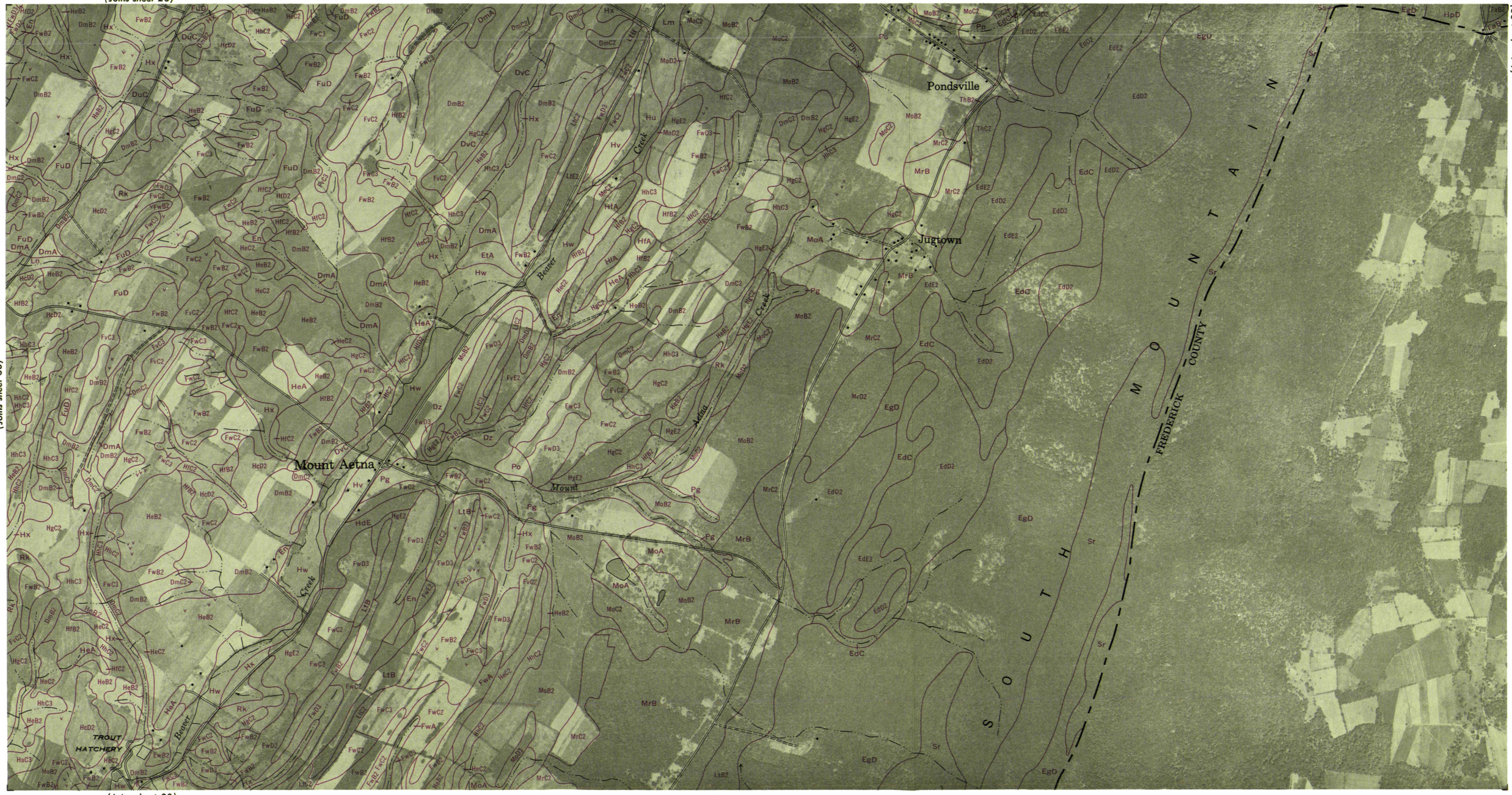
(Joins sheet 28)

(Joins sheet 29)

(Joins sheet 33)

(Joins sheet 38)

N



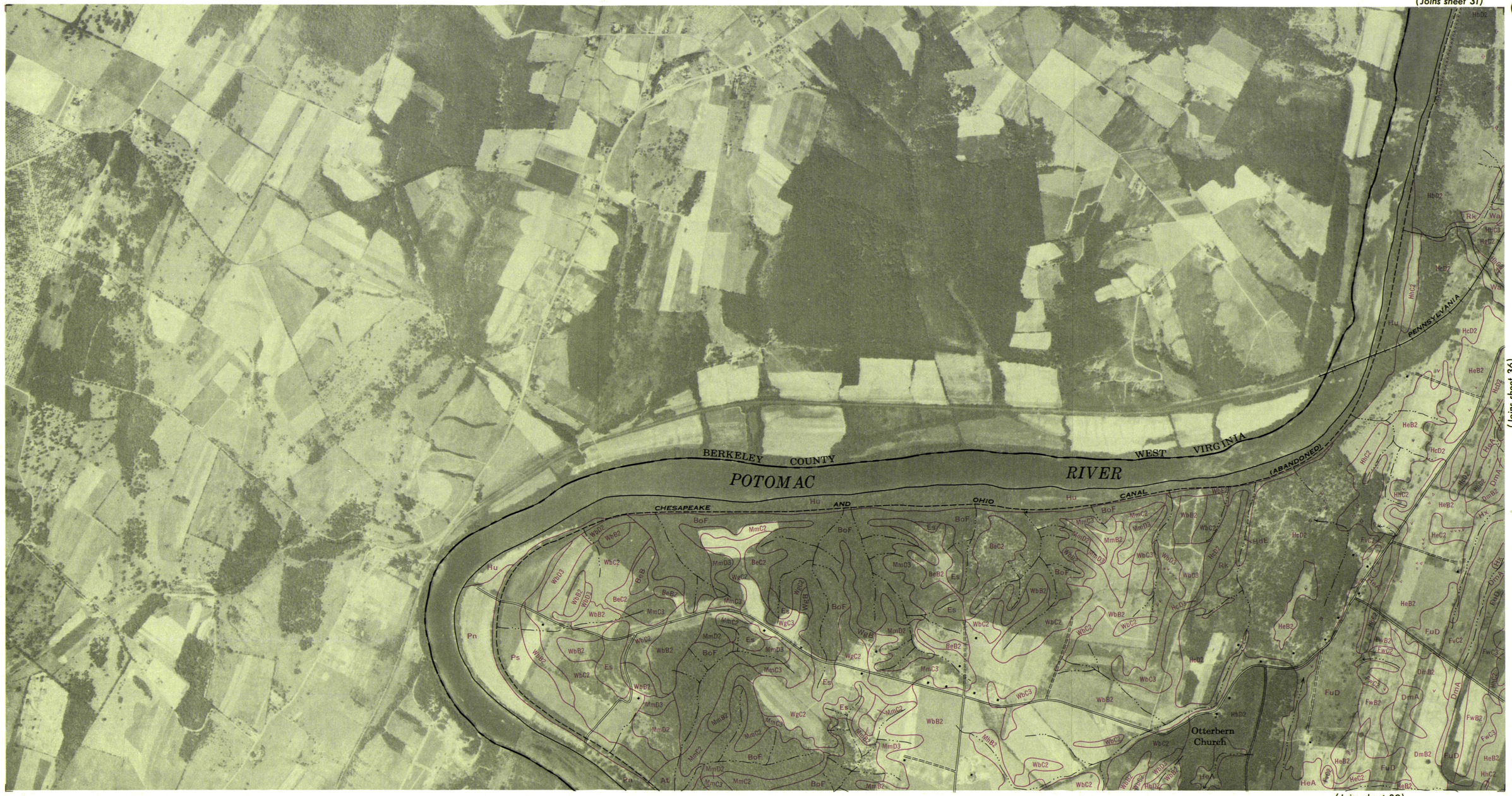
0 ½ 1 Mile Scale 1:15840 0 5000 Feet

WASHINGTON COUNTY, MARYLAND - SHEET NUMBER 35

(Joins sheet 31)

35

N



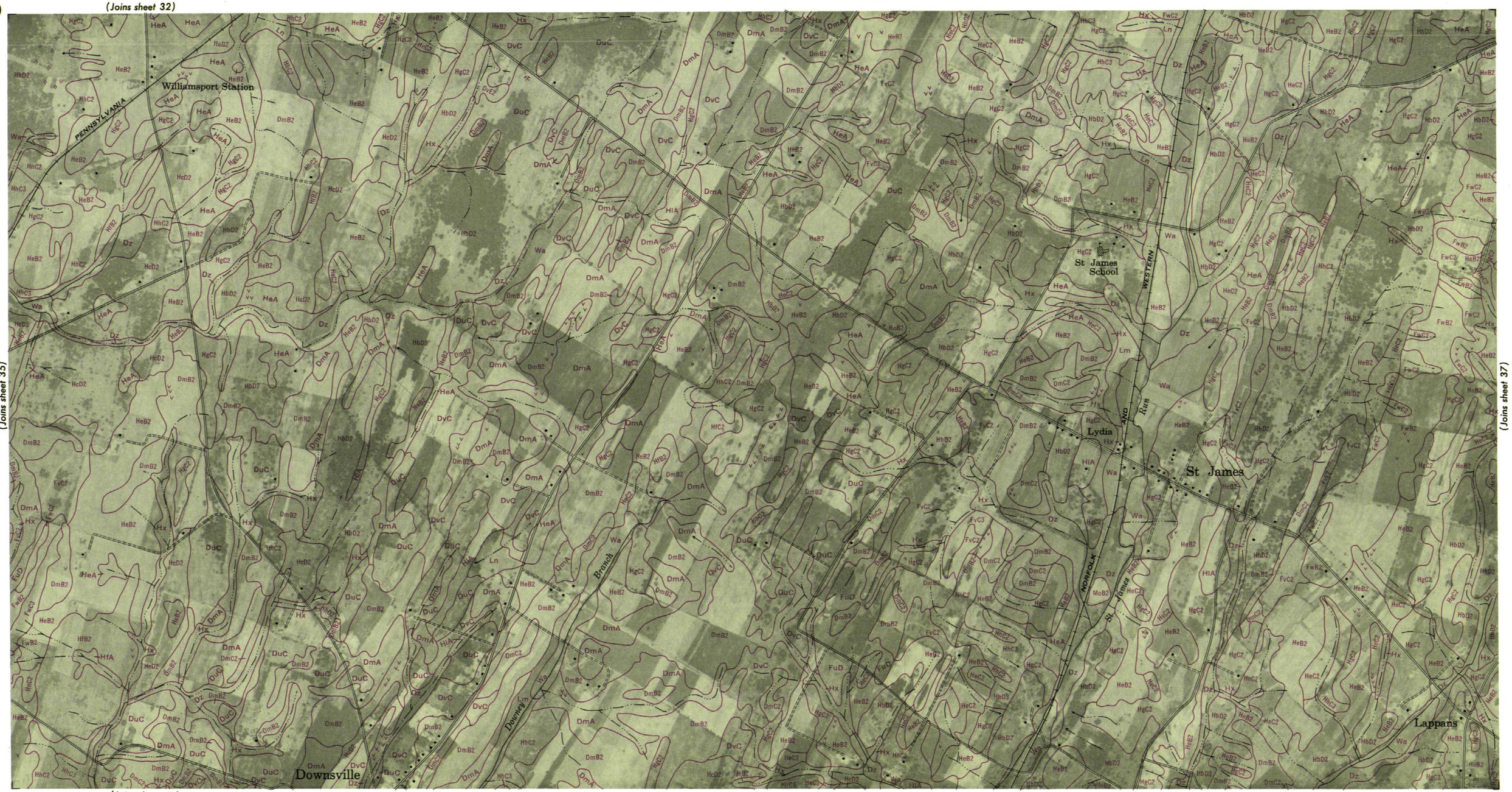
(Joins sheet 36)

(Joins sheet 39)

0 ½ 1 Mile Scale 1:15840 0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1958.

WASHINGTON COUNTY, MARYLAND—SHEET NUMBER 36



(Joins sheet 33)

(Joins sheet 36)

(Joins sheet 38)

(Joins sheet 41)

0 ½ 1 Mile Scale 1:15840 0 5000 Feet

(Joins sheet 35)

(Joins lower right)

(Joins sheet 43)

(Joins sheet 40)

(Joins upper left)

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

(40)

(Joins sheet 36)

(Joins sheet 39)

(Joins sheet 41)

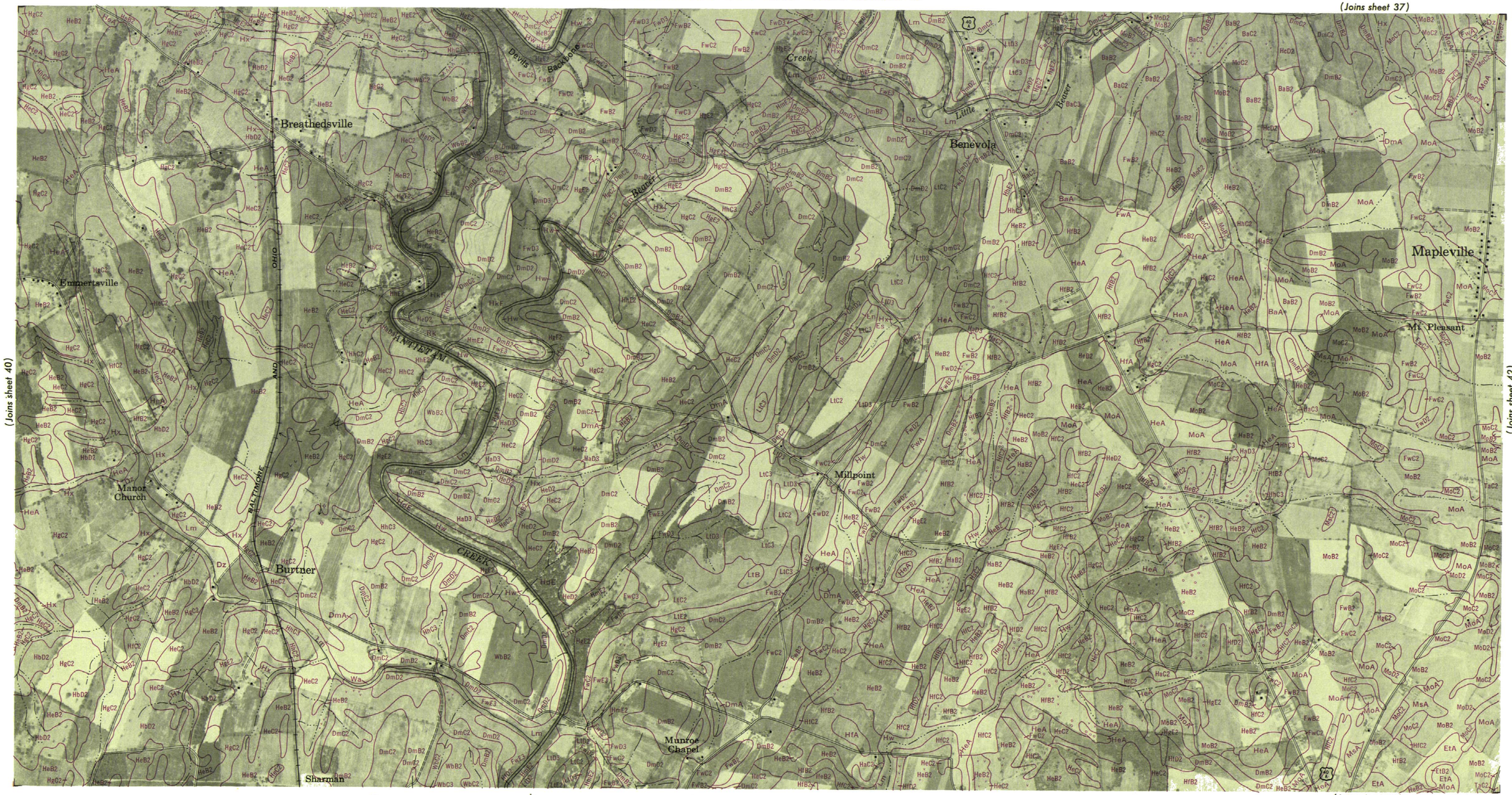
(Joins sheet 43)

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

(Joins sheet 37)



(Joins sheet 40)

(Joins sheet 42)

(Joins sheet 44)

(Joins sheet 38)

(Joins sheet 41)

(Joins sheet 45)

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

WASHINGTON COUNTY, MARYLAND – SHEET NUMBER 43

(Joins sheet 40)

(Joins inset, sheet 39)

(Joins sheet 44)

(Joins sheet 46)

N

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1958.

(Joins sheet 41)

(Joins sheet 43)

(Joins sheet 45)

(Joins sheet 47)

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

(46) Γ

(Joins sheet 43)

(Joins sheet 47)

(Joins sheet 48)

N

0 ½ 1 Mile Scale 1:15840 0 5000 Feet

L

WASHINGTON COUNTY, MARYLAND – SHEET NUMBER 47

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1958.

(Joins sheet 46) | (Joins sheet 47)

(48)

N

(Joins sheet 49)

(Joins sheet 50)

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

(Joins sheet 47) | (Joins inset, sheet 45)

(Joins sheet 48)

(Joins sheet 51)

50

N

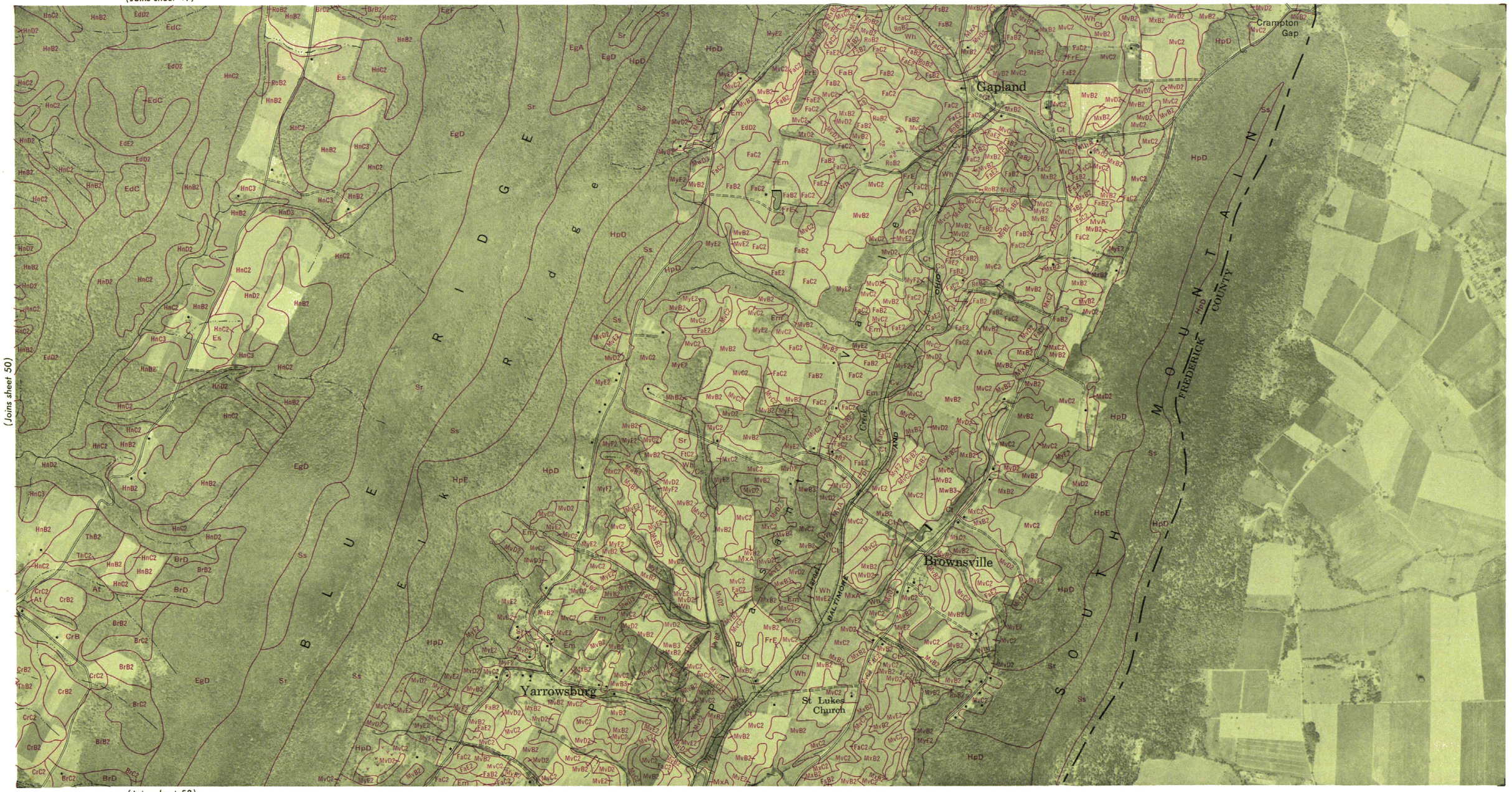
0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

(Joins sheet 49)

(Joins sheet 50)

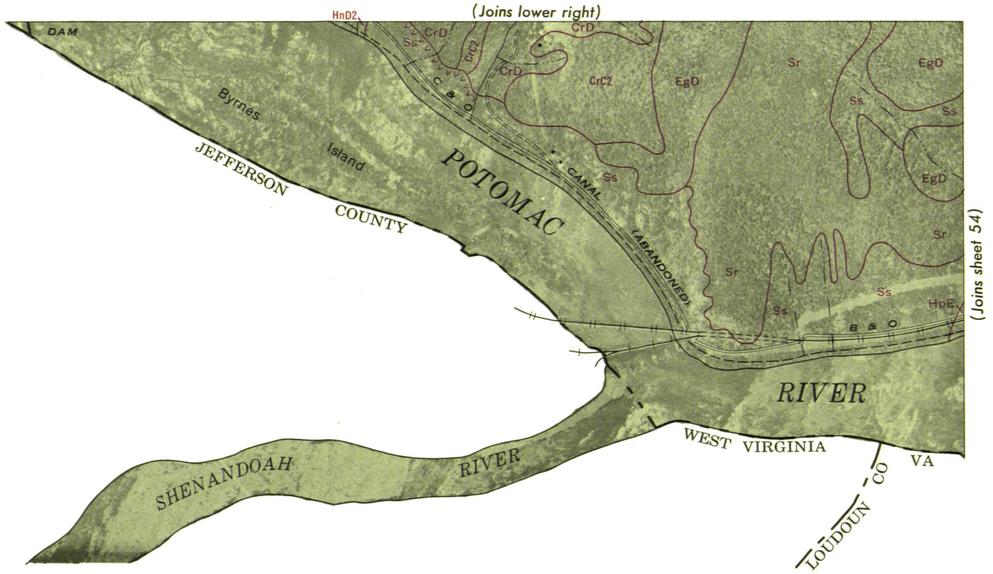


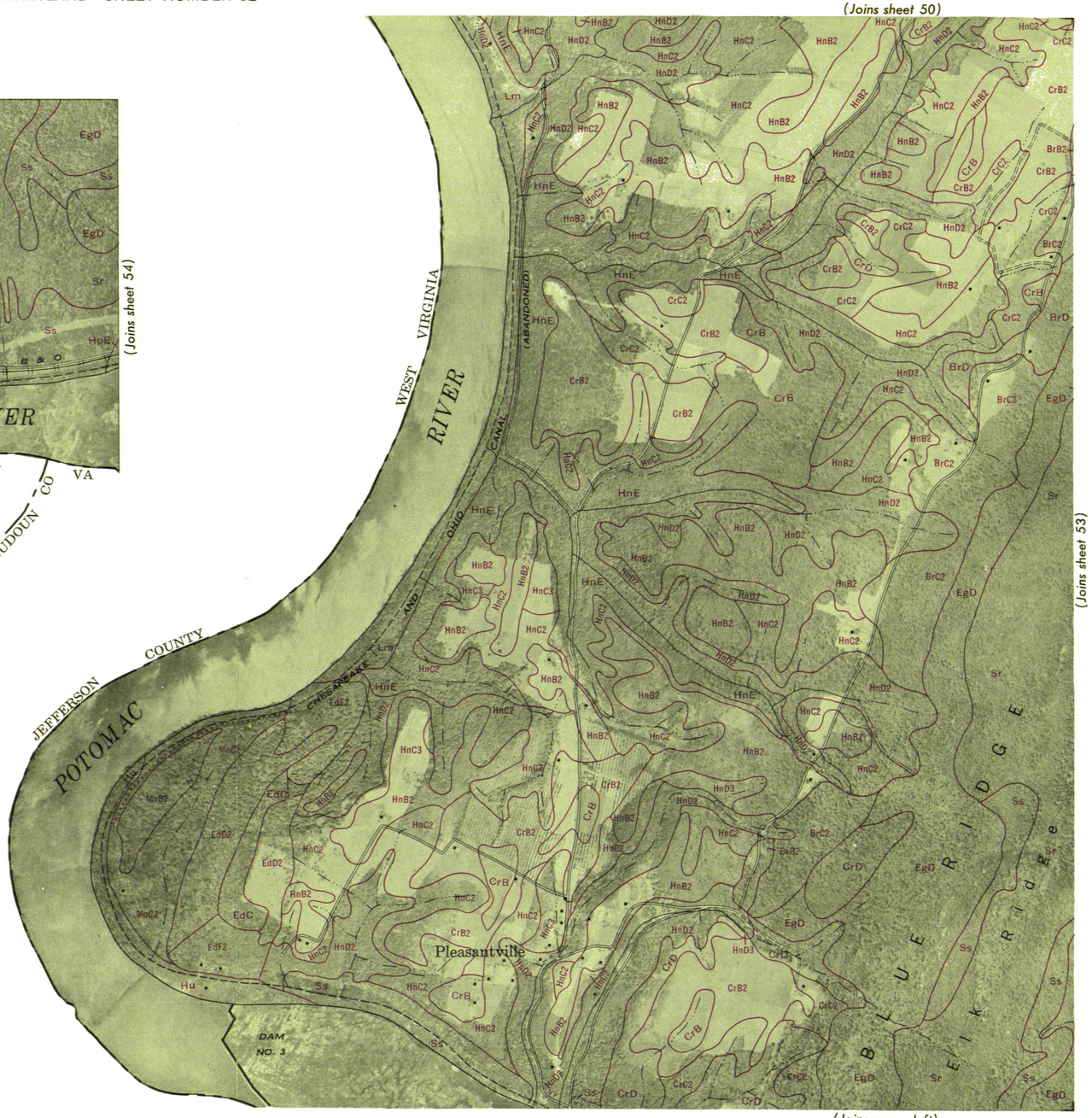
(Joins sheet 53)

0 ½ 1 Mile Scale 1:15840 0 5000 Feet

52

N





0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

0 ½ 1 Mile

Scale 1:15840

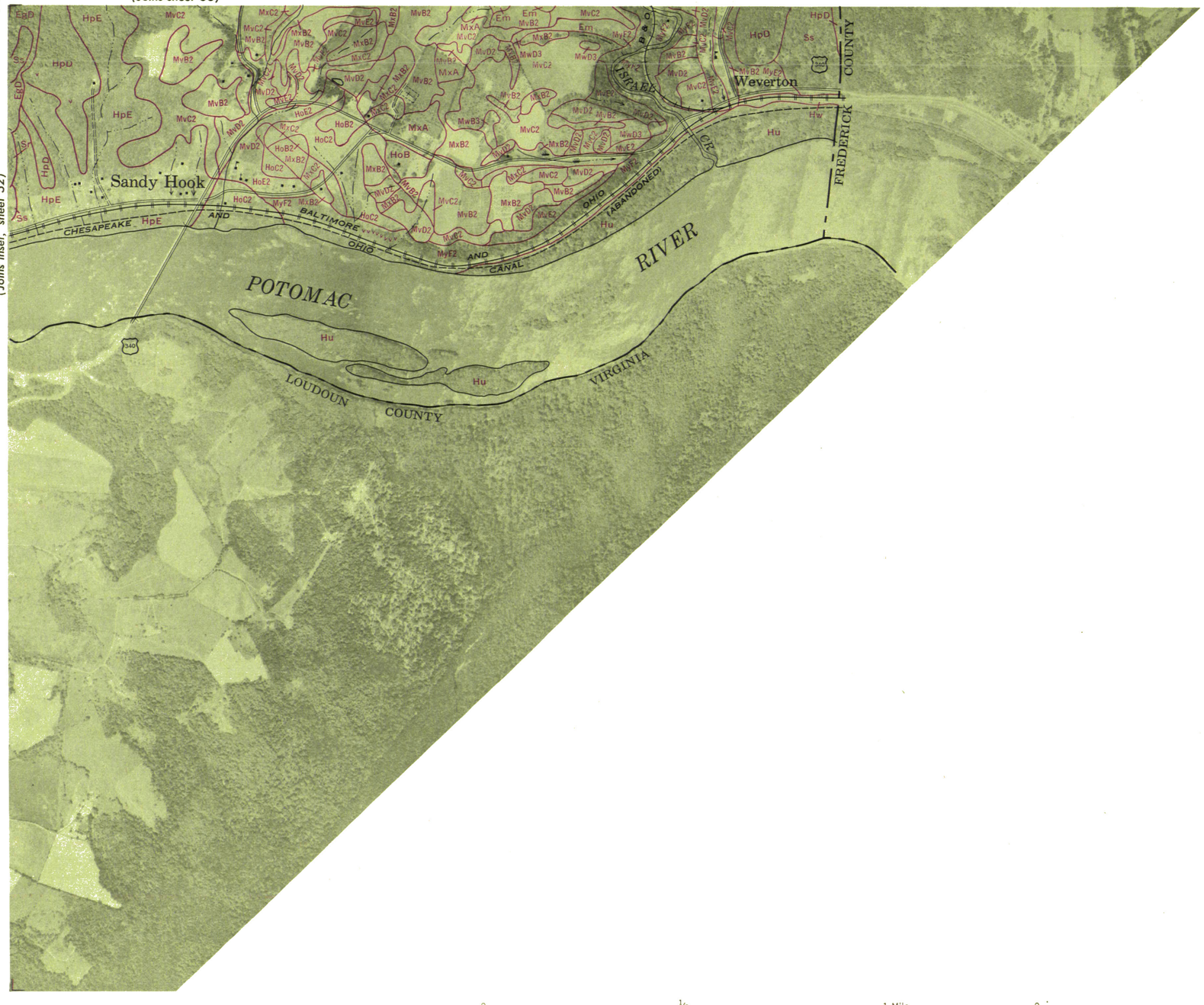
0 5000 Feet

54

(Joins sheet 53)

N

(Joins inset, sheet 52)



0 ½ 1 Mile

Scale 1:15840

0 5000 Feet